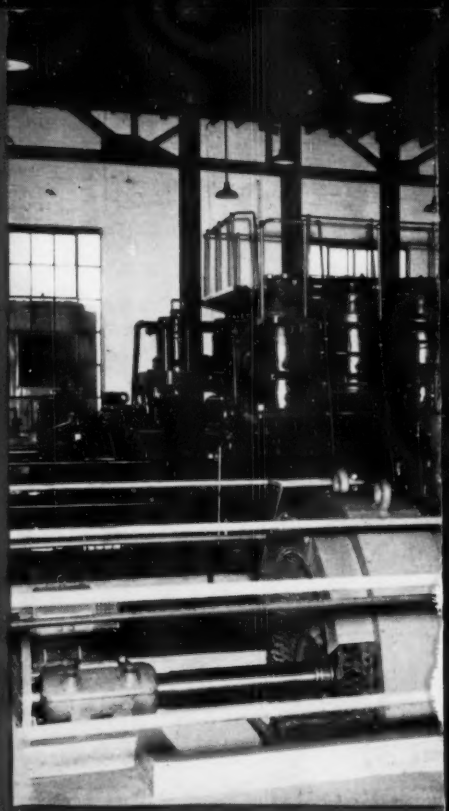
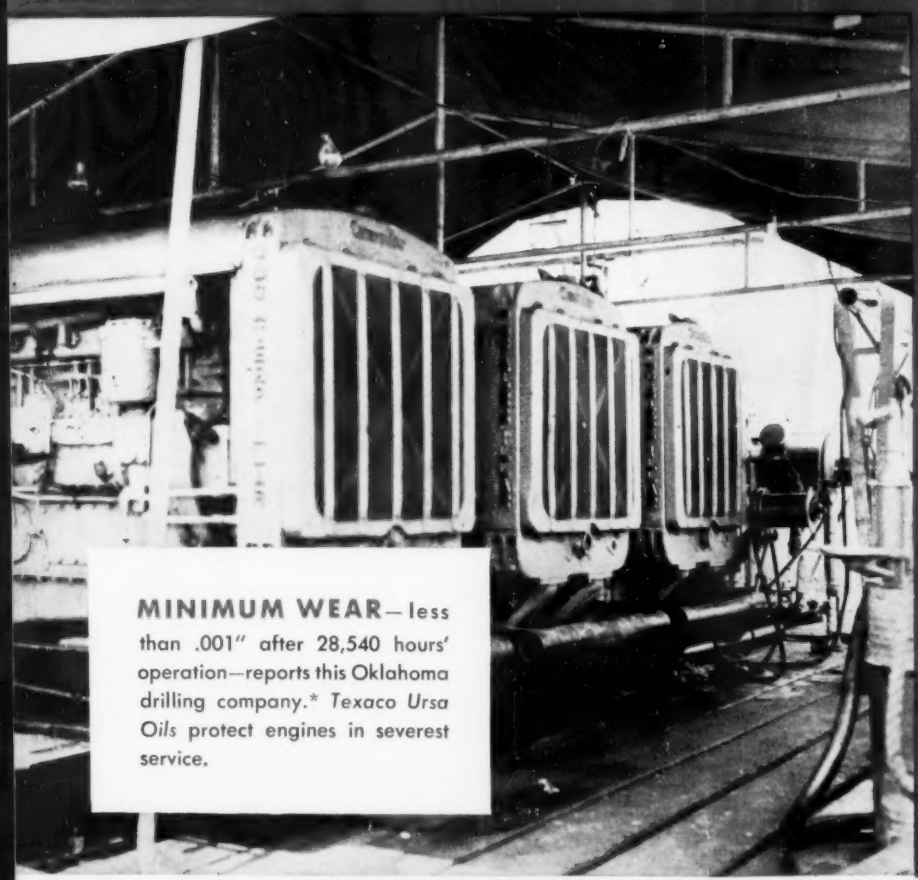
diesel power

JULY 1954

GOOD REASONS WHY...

FOR OVER 20 YEARS, MORE STATIONARY DIESEL H.P. IN THE U.S. HAS BEEN LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND





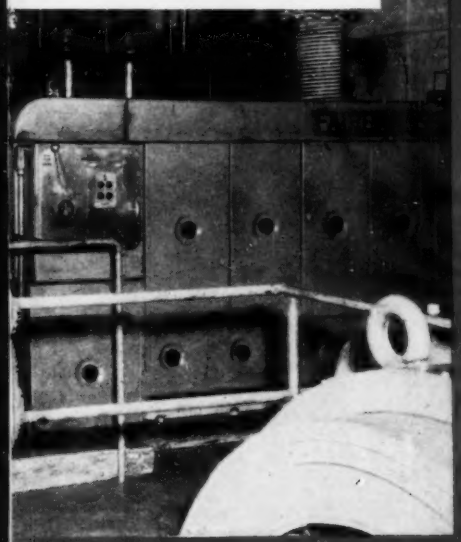
MINIMUM WEAR—less than .001" after 28,540 hours' operation—reports this Oklahoma drilling company.* *Texaco Ursa Oils* protect engines in severest service.

MORE POWER with less fuel. With Texaco lubrication, this diesel* has, in 14 years, generated over 71 million kwh at the rate of 12.16 kwh per gallon of fuel.

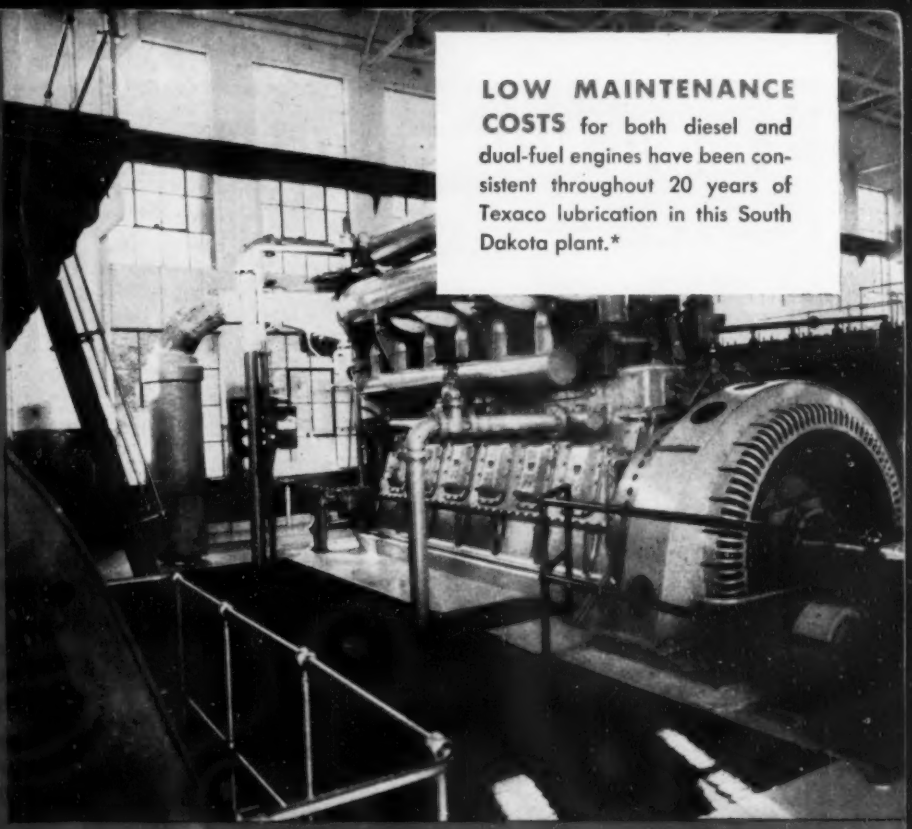
TEXACO

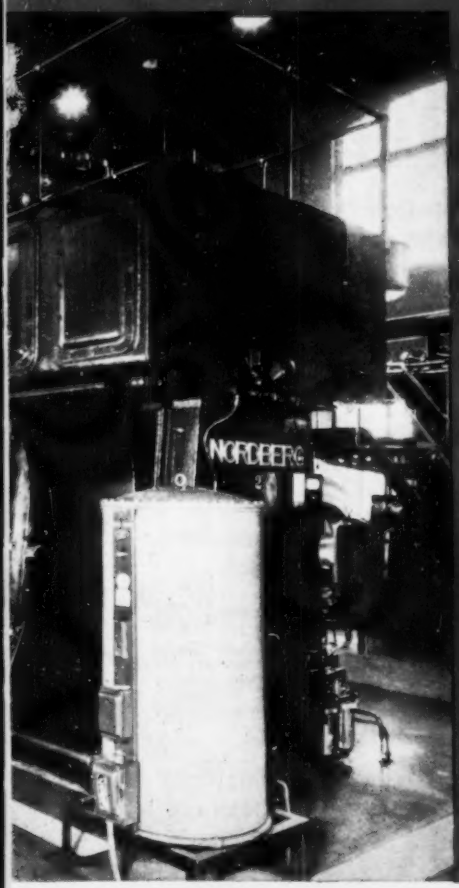
TEXACO

LOW FUEL CONSUMPTION. This Texas plant* hasn't had a stuck ring in 20 years. *Texaco Ursa Oils* assure free rings for proper compression and combustion.



LOW MAINTENANCE COSTS for both diesel and dual-fuel engines have been consistent throughout 20 years of Texaco lubrication in this South Dakota plant.*





BETTER LUBRICATION

assured for all types and sizes of diesel, gas and dual-fuel engines, regardless of operating conditions or fuel used. Just use one of the famous *Texaco Ursa Oils* — a complete line especially refined to make engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

A Texaco Lubrication Engineer will gladly help you select the proper ones for your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

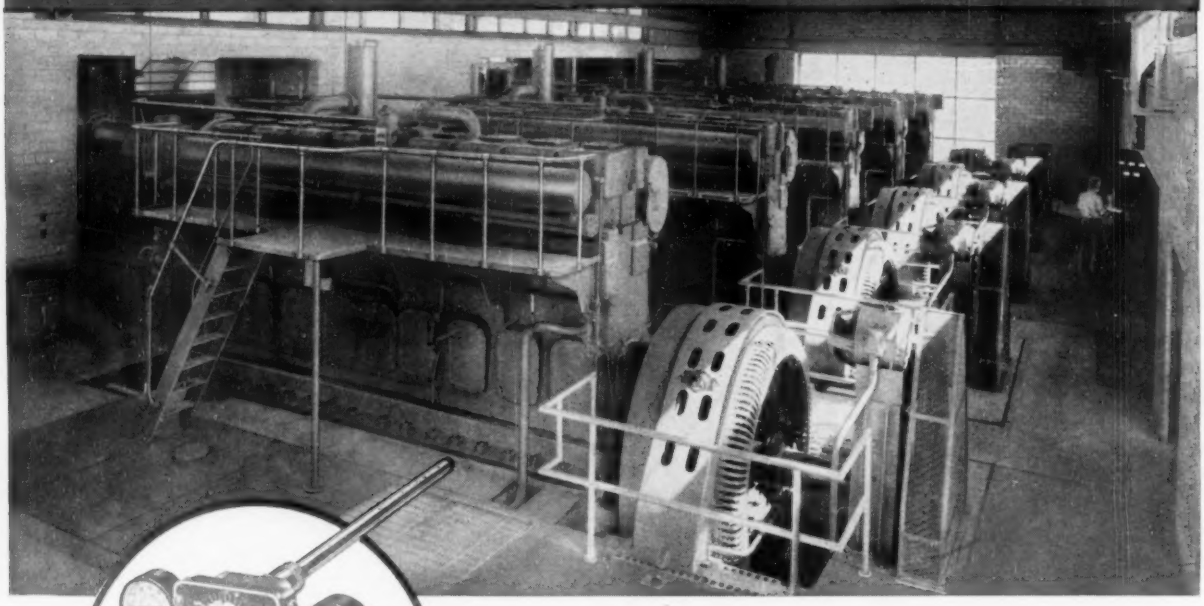
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

* *Name on request.*

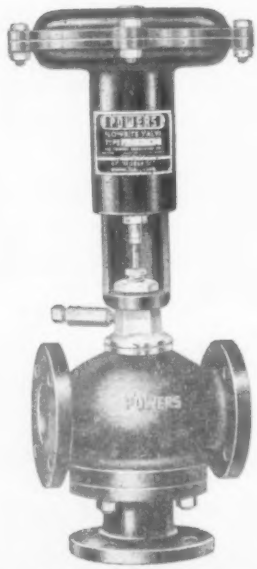
URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

5 COOPER BESSEMER 1850 HP Supercharged DIESEL ENGINES

At WESTERN MINNESOTA POWER CO-OP., BENSON, MINN.



POWERS ACCRITEM REGULATOR
Time tested and proven dependable



POWERS FLOWRITE 3-Way VALVE

(b75)

Jacket Water and Lube Oil Temperature Controlled by POWERS

Here's another "Blue Ribbon" installation. Right engines for the job – right control for the engines.

Many temperature control problems can be solved best by POWERS versatile ACCRITEM-FLOWRITE system. Waste heat recovery, fuel and combustion air ratio-ing, and heavy oil preheat control are examples. Advantages of this pressure operated system are:

Closer Temperature Control because of greater valve power, adjustable sensitivity, and superior valve throttling characteristics.

More Reliable In Service because of fail-safe valve feature, over-range protection, and general rugged construction.

More Convenient In Use because of adjustable temperature control and indicating gages.

Easy To Install because of smaller temperature sensitive element; use of air, water, or oil as operating medium; copper tubing used between regulator and valve.

Reasonably Priced. Contact POWERS nearest office or write us direct for details on the ACCRITEM-FLOWRITE system of temperature control.

Established in 1891 • THE POWERS REGULATOR COMPANY • SKOKIE, ILL. • Offices in Over 50 Cities

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diesel power

Established in 1923 **Vol. 32, No. 7** **July, 1954**

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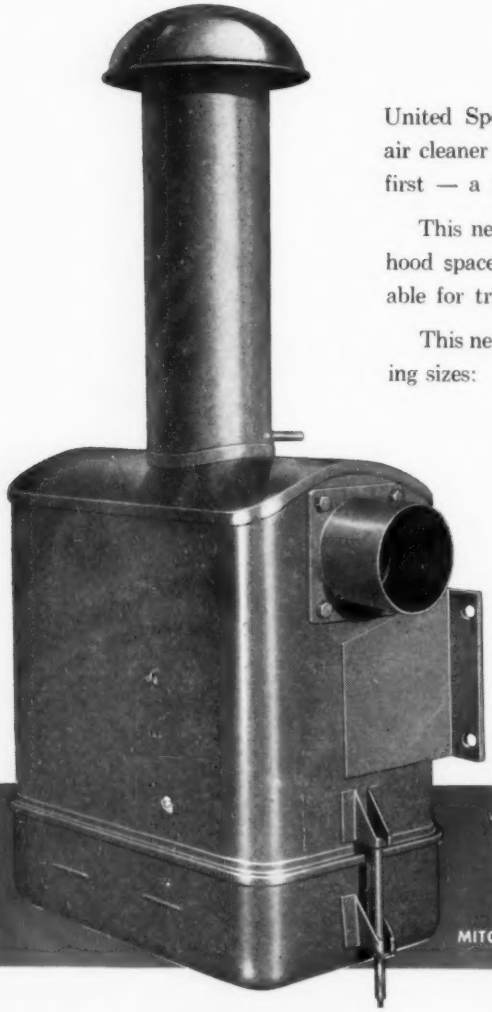
This Month's Cover

Again the big red "Sold" tag symbolizes the results of listings in this, the July Buyers' Guide issue.

NOW!

United Specialties presents

a New Rectangular Diesel Air Cleaner...



United Specialties Company, originator of many new, important air cleaner designs, now announces another significant air cleaner first — a rectangular oil bath air cleaner for diesel engines.

This new design was created to better utilize limited under-the-hood space — provide more space for other accessories. It is available for truck and tractor engines, and for industrial power units.

This new rectangular oil bath air cleaner is available in the following sizes:

5¾ x 9½ for an air capacity of 175 cfm
6½ x 11 for an air capacity of 240 cfm
7½ x 12¼ for an air capacity of 300 cfm
8¾ x 14 for an air capacity of 400 cfm
10 x 16 for an air capacity of 525 cfm
11½ x 19½ for an air capacity of 740 cfm

Our sales engineers will be happy to give you full details on the new rectangular diesel air cleaner. Write for complete details.

UNITED SPECIALTIES COMPANY

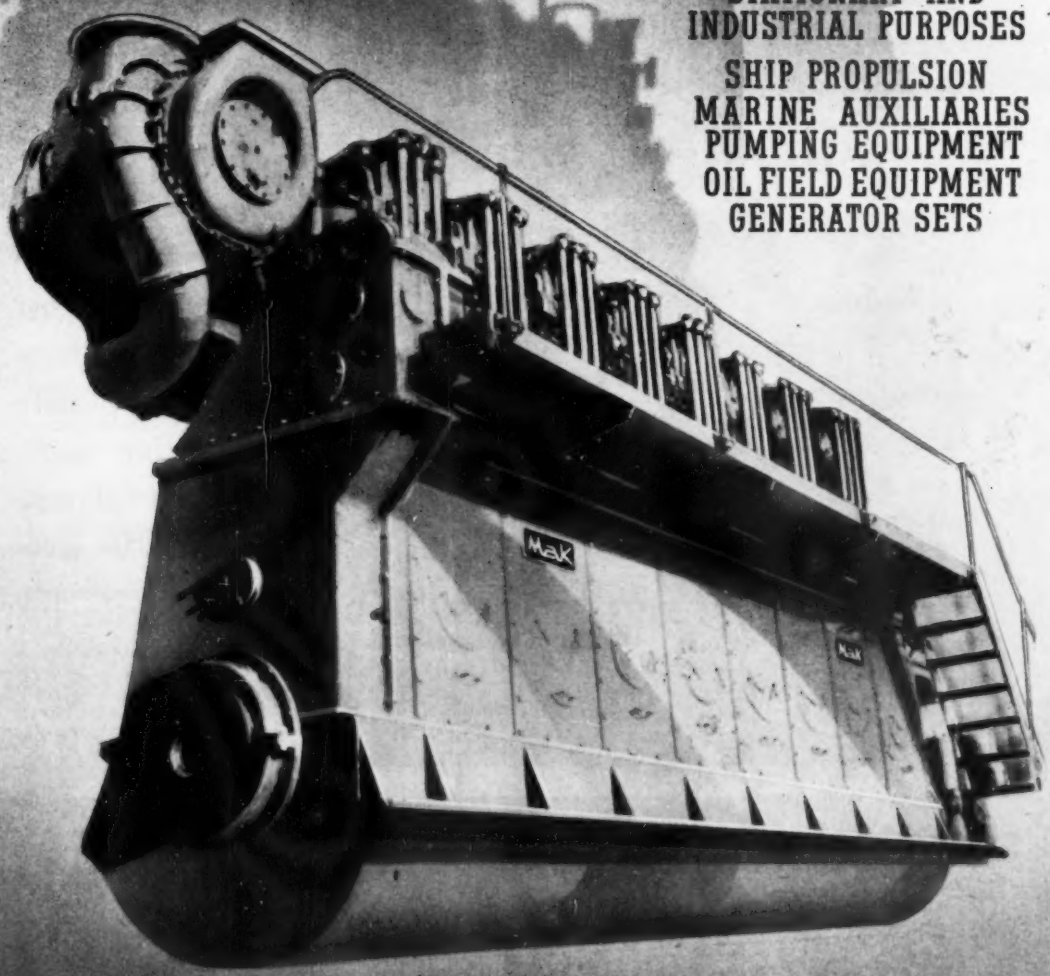
UNITED AIR CLEANER DIVISION — CHICAGO 28, ILL.
MITCHELL DIVISION — PHILADELPHIA 36, PA. • BIRMINGHAM 11, ALABAMA

Air Cleaners · Metal Stampings · Rolled Shapes · Ignition Switches · Turn Signal Switches · Dovetails

MaK Diesel

FOR MARINE-
STATIONARY- AND
INDUSTRIAL PURPOSES

SHIP PROPULSION
MARINE AUXILIARIES
PUMPING EQUIPMENT
OIL FIELD EQUIPMENT
GENERATOR SETS

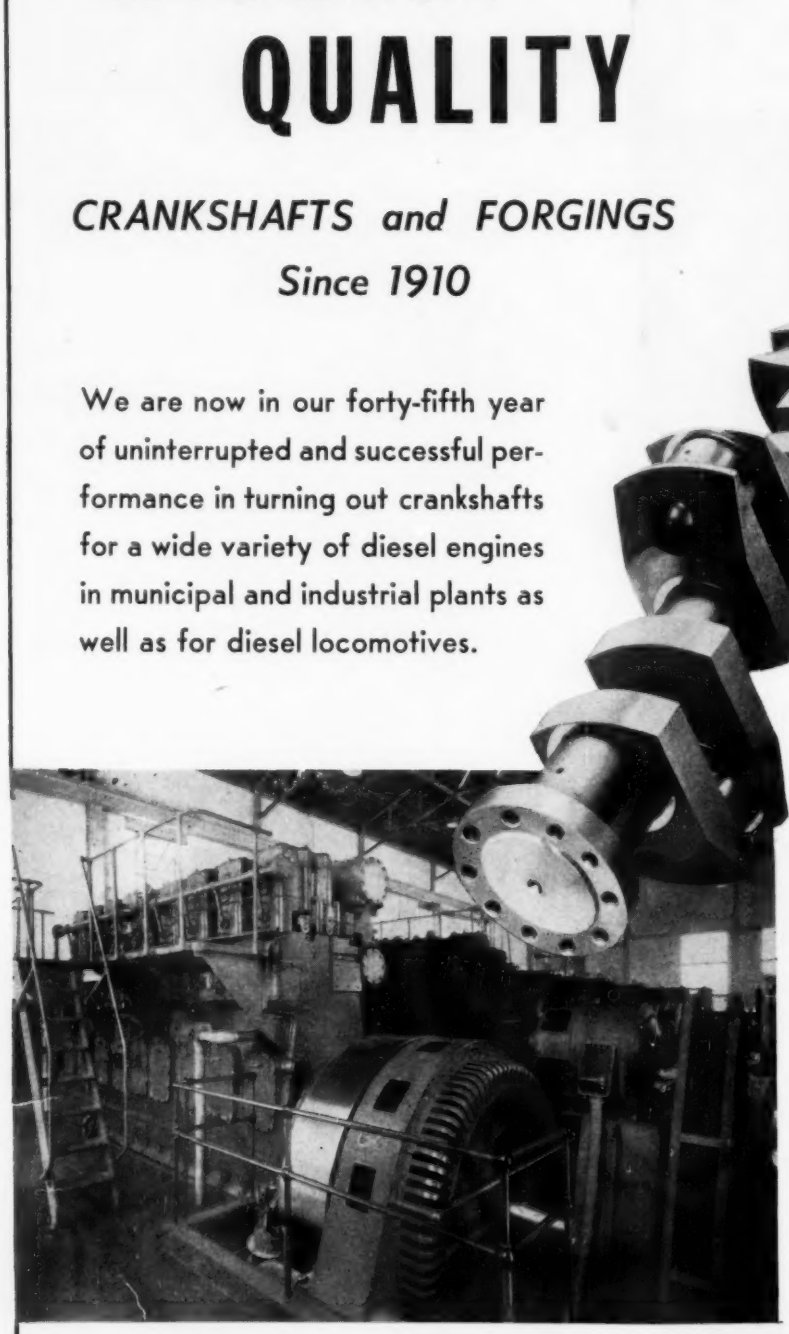


MASCHINENBAU KIEL AKTIENGESELLSCHAFT · MaK

HIGHEST QUALITY

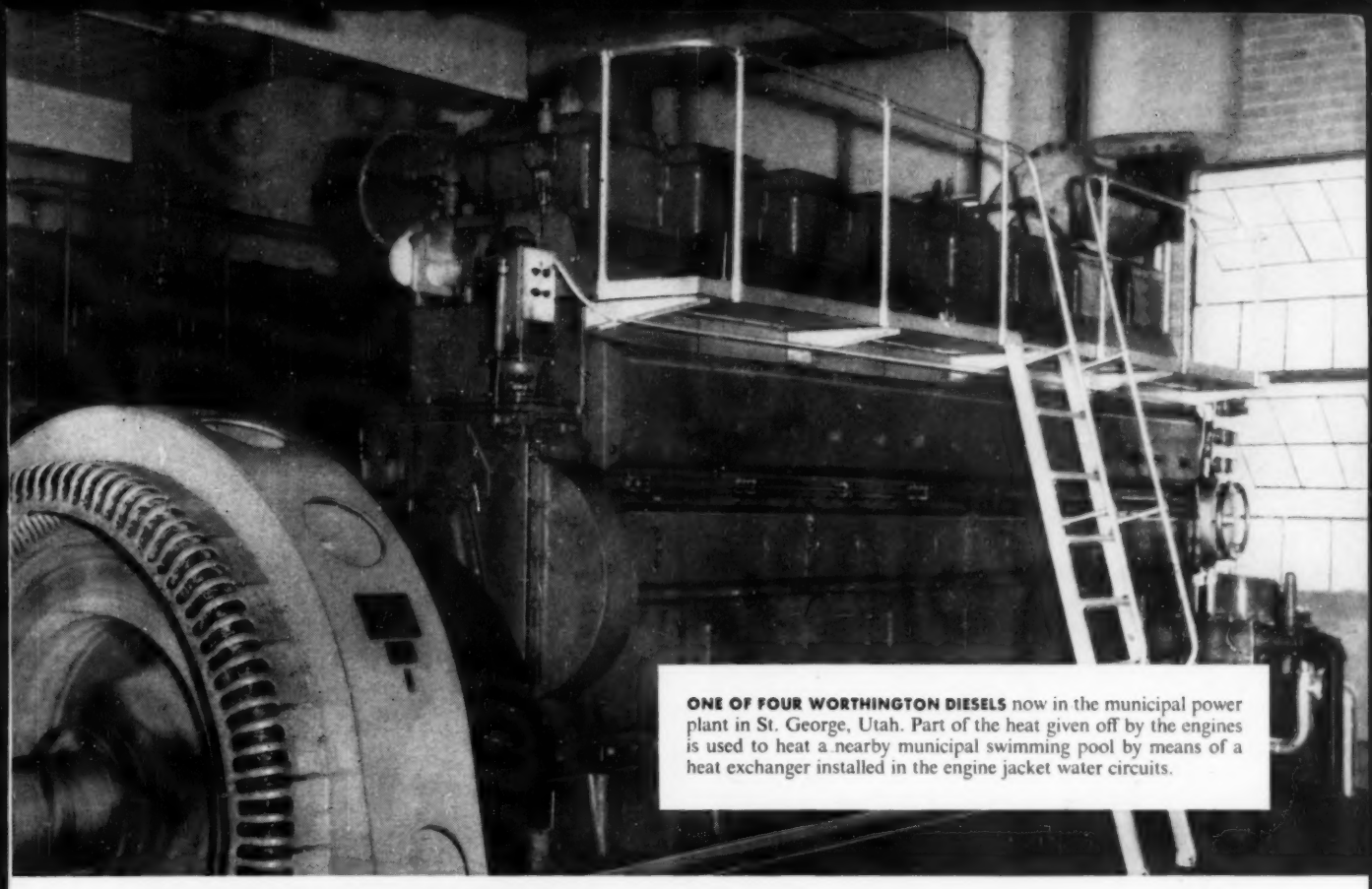
CRANKSHAFTS and FORGINGS
Since 1910

We are now in our forty-fifth year of uninterrupted and successful performance in turning out crankshafts for a wide variety of diesel engines in municipal and industrial plants as well as for diesel locomotives.

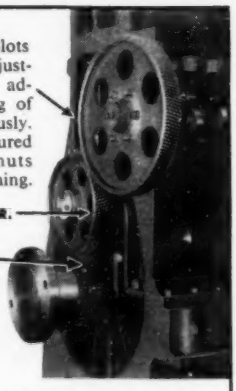


Because of our vast experience and knowledge we can turn out crankshafts and forgings to your complete satisfaction as to quality and delivery. Consult us for your forging requirements.

ELLWOOD CITY FORGE COMPANY
CRANKSHAFTS • CONNECTING RODS • MACHINE FORGINGS
ELLWOOD CITY, PENNA.



ONE OF FOUR WORTHINGTON DIESELS now in the municipal power plant in St. George, Utah. Part of the heat given off by the engines is used to heat a nearby municipal swimming pool by means of a heat exchanger installed in the engine jacket water circuits.



MAIN CAMSHAFT GEAR. Slots in gear provide single adjustment for retarding or advancing injection timing of all cylinders simultaneously. Final gear adjustment secured with castellated locknuts wired after final tightening.

FREE FLOATING IDLER GEAR.

SPLIT GEAR KEYED ON CRANKSHAFT. Permanent adjustment for perfect alignment with idler gear is easily accomplished.

WORTHINGTON HELICAL STEEL GEAR TRAIN

used on these Worthington dual fuel engines . . .

1. Provides accurate and positive control of engine timing.
2. Is located at flywheel end of engine for smooth gear operation as power impulses are absorbed by the flywheel.
3. Uses controlled automatic oil jet lubrication that eliminates wear.
4. Assures correct engine timing . . . keeps engine running smoothly . . . results in low fuel consumption and minimum engine maintenance.

Good planning keeps municipal power plant profitable

Eleven years ago, the City of St. George, Utah, started power-plant operations with two Worthington four-cycle, direct injection Diesel engines. Today, the capacity of St. George's plant is 500% greater than it was in 1942—and profits are still being returned to the City of St. George.

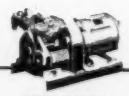
St. George planned its power plant to keep pace with increasing power needs and to continue to show profits. That's where Worthington came in. Worthington engineers helped St. George select exactly the right size and type of equipment—engines, circulating water pumps, fuel transfer pumps and air starting equipment.

Because of its complete satisfaction with the original Worthington units, St. George purchased a third Worthington Diesel in 1947, a fourth in 1949, and a fifth in 1950. At present a total of four units are in operation, one unit having been replaced by a larger unit in 1950.

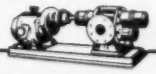
Worthington may be able to help save power costs for your community, too. Write your nearest Worthington district office or Worthington Corporation, Engine Division, Section E.3.2, Buffalo, New York.

E.3.2

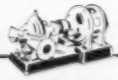
Worthington-Built Auxiliaries



ENGINE STARTING COMPRESSORS



OIL TRANSFER PUMPS,



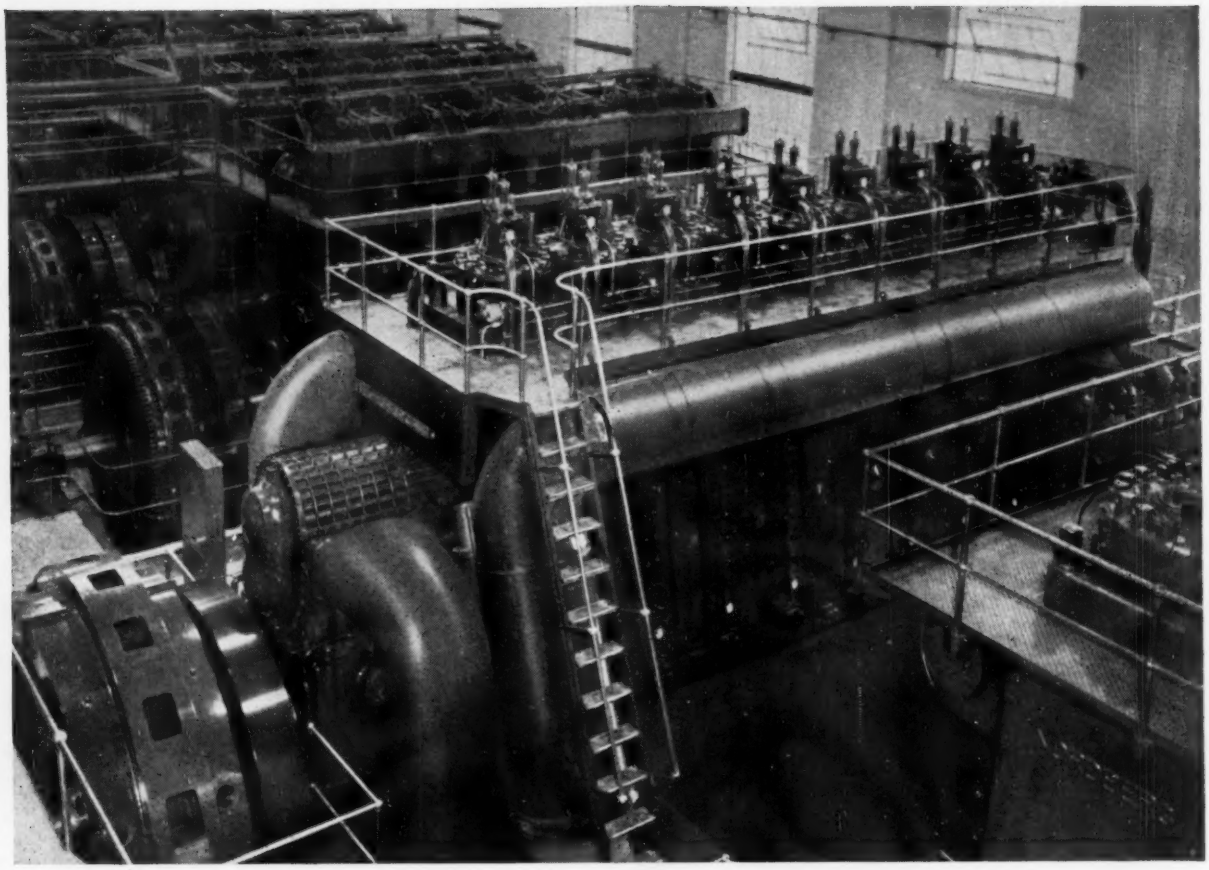
COOLING WATER CIRCULATING PUMPS

EVAPORATIVE-TYPE ENGINE WATER COOLERS

WORTHINGTON

Engines

Economical Continuous Power—Diesels, Oil and Dual Fuel, and Spark-Ignition Gas Engines, from 190 to 2,100 bhp.



Largest Diesel Power Generating Station in the U.S.

reduces cylinder and piston ring wear with SHELL ROTELLA OIL

Electric power for the City of Grand Haven, Michigan, and the surrounding area, is generated by diesel engines in the largest municipal power station of its kind in the U. S. A. Shell Rotella Oil is the cylinder lubricant.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid action from the by-products of incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

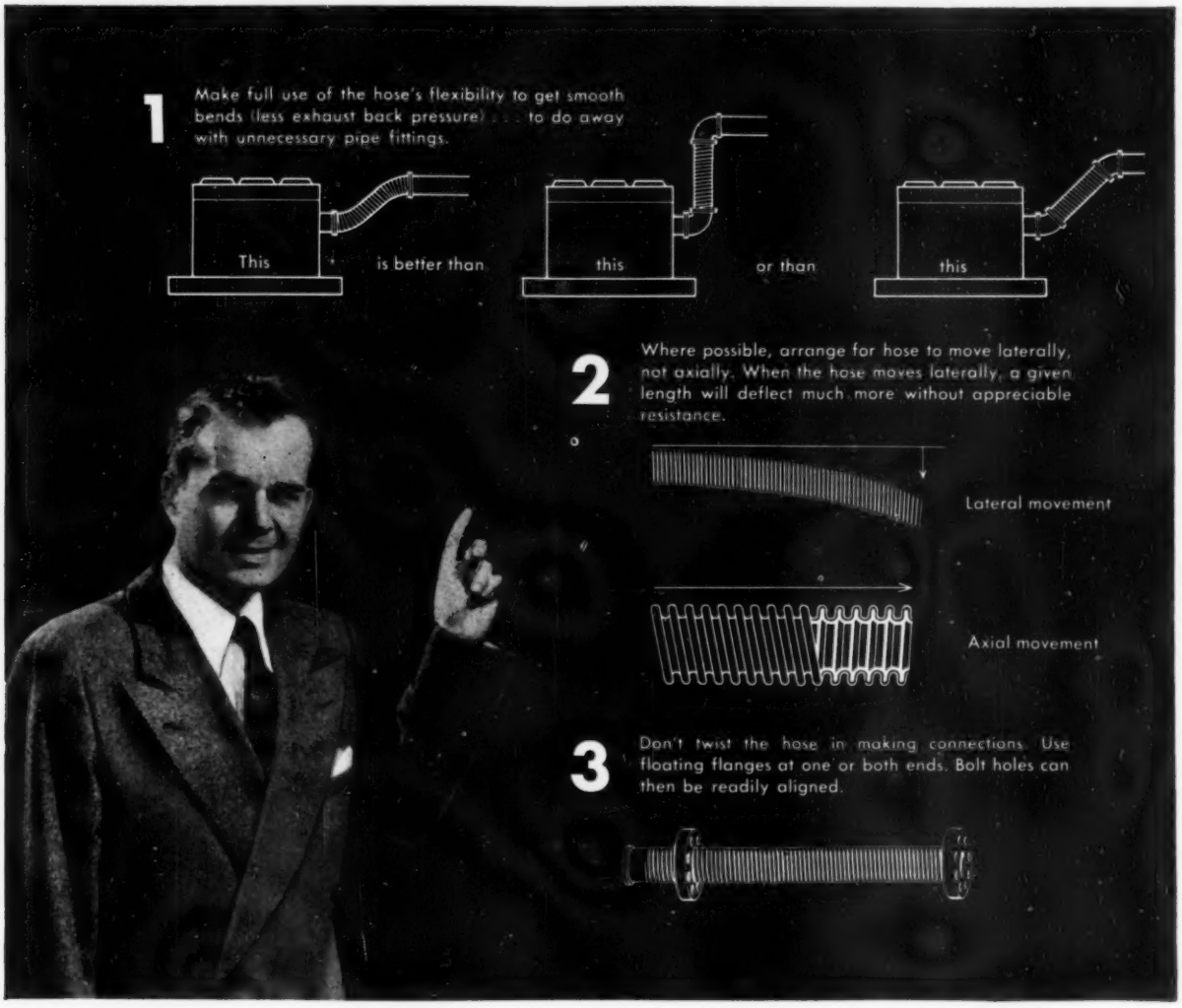
SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK

100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

3 tips on how to install American Flexible Steel Hose in diesel exhaust systems


1
Make full use of the hose's flexibility to get smooth bends (less exhaust back pressure) . . . to do away with unnecessary pipe fittings.
This
is better than
this
or than
this
2
Where possible, arrange for hose to move laterally, not axially. When the hose moves laterally, a given length will deflect much more without appreciable resistance.
Lateral movement
Axial movement
3
Don't twist the hose in making connections. Use floating flanges at one or both ends. Bolt holes can then be readily aligned.

No exhaust system for a diesel engine is *complete* without flexible exhaust hose. Countless actual installations have proven that *American Flexible Steel Exhaust Hose* can "take it" in the day-in day-out grind of carrying hot exhaust gases . . . safely and reliably at low cost.

American Flexible Steel Exhaust Hose absorbs vibration and reduces its transmission...allows for expansion or contraction caused by temperature changes in the exhaust lines. There's less chance of overstressing bolts or distorting engine parts.

This hose bends into desired position easily. Its flexibility also simplifies installation when considerable offset is required. Once it's installed, you're sure of years of trouble-free service.

American Flexible Metal Hose for exhaust and air intake—marine or industrial diesels—is available in corrugated steel, 2 in. to 16 in. I.D. inclusive. For full details, write for Bulletin EH-50-1. *The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn. In Canada: The Canadian Fairbanks-Morse Co., Ltd.*

OTHER PRODUCTS FOR DIESEL USE – Flexible tubing with wire braid covering for: starting air, circulating water, fuel oil, lubricating oil. Tubing available in bronze, carbon steel and stainless steel. Assemblies complete with fittings.

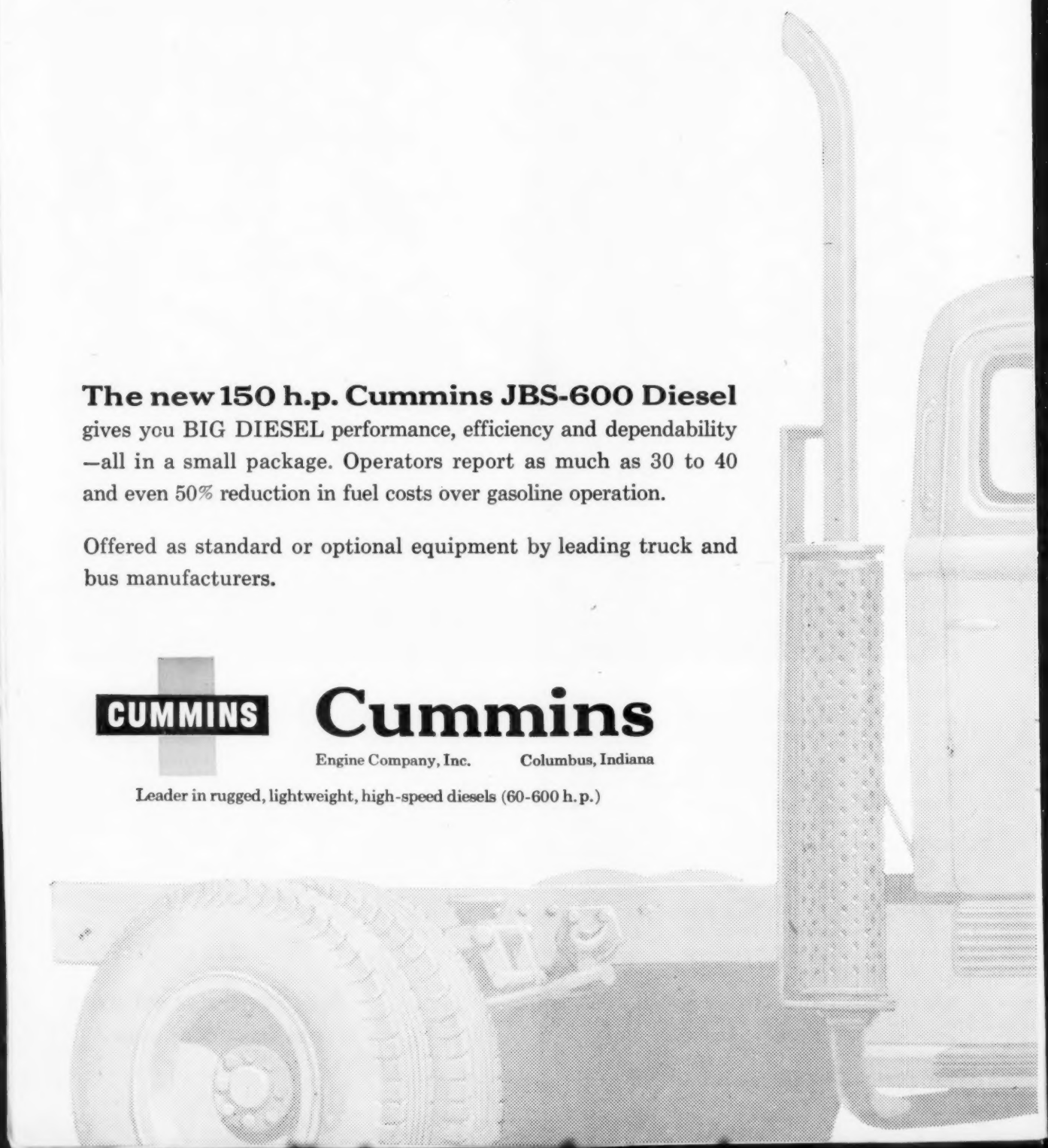
WHEREVER CONNECTORS MUST MOVE

AMERICAN

flexible metal hose and tubing

an **ANACONDA®** product

Get more mileage per fuel



The new 150 h.p. Cummins JBS-600 Diesel gives you BIG DIESEL performance, efficiency and dependability —all in a small package. Operators report as much as 30 to 40 and even 50% reduction in fuel costs over gasoline operation.

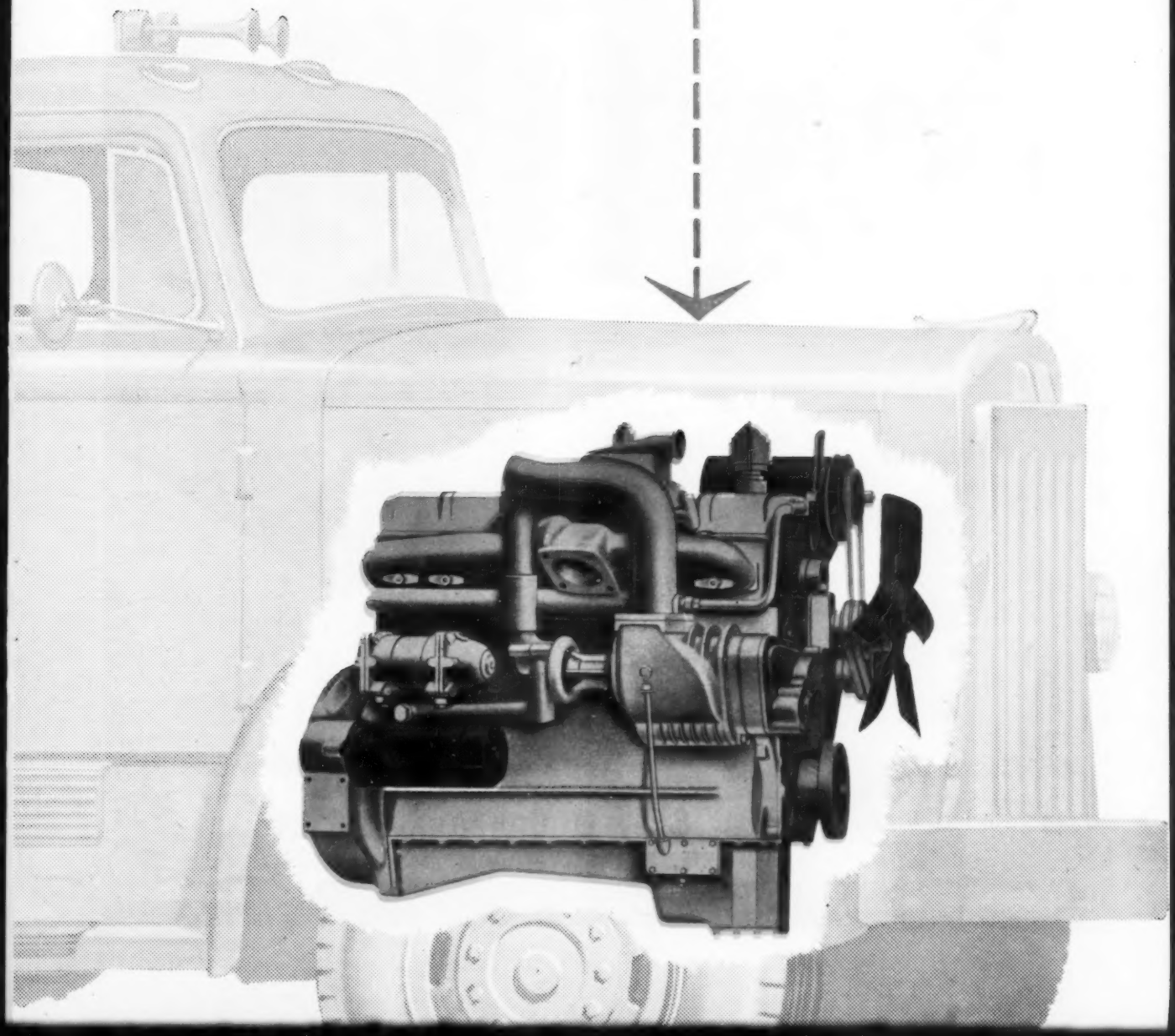
Offered as standard or optional equipment by leading truck and bus manufacturers.

CUMMINS **Cummins**

Engine Company, Inc. Columbus, Indiana

Leader in rugged, lightweight, high-speed diesels (60-600 h. p.)

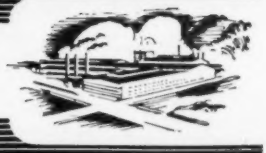
dollar with your medium-heavy trucks



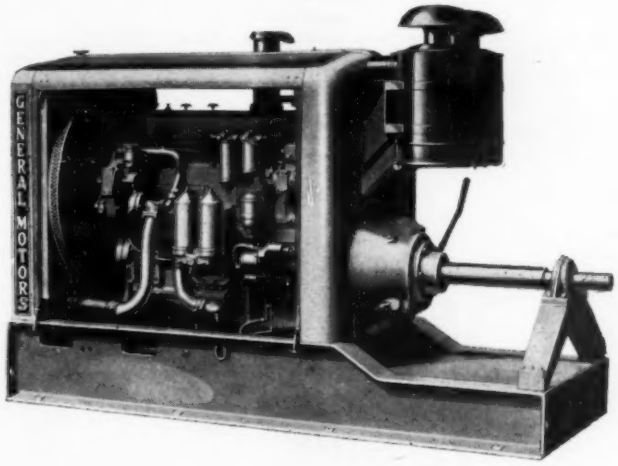
Tons of STEEL... Forged and Machined to Exacting Specifications at ERIE FORGE!

THE main press cylinder here illustrated is a part of a huge extrusion press for the Air Force. Some of these presses are rated at 50,000 tons. This forging was produced from ingot to finished job here at Erie Forge & Steel Corporation. Extremely close tolerances were required on the finished part with particular attention being paid to the polished finish on the interior walls. Expert craftsmen performed every operation here in our plant . . . one control, one responsibility. We are specialists in producing steel forgings—all shapes and sizes. Consult with Erie Forge on your next forging requirements.

ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA



NOW 300 HORSEPOWER



in GM "6-110" diesel engine

Improved Design Gives Still More Power Per Pound From Same Size Unit

Want more power—and production—from your heavy-duty equipment?

Stymied because you can't fit a higher-horsepower Diesel into your units?

Now you can get the power you need—and the increased production you want—with a new 300-horsepower General Motors "110" Diesel—the engine that delivers more torque in the working range. And, you can get them with no increase in engine size or weight.

Higher horsepower means faster operating speeds—high torque means more working power—for operators of all kinds of heavy-duty units.

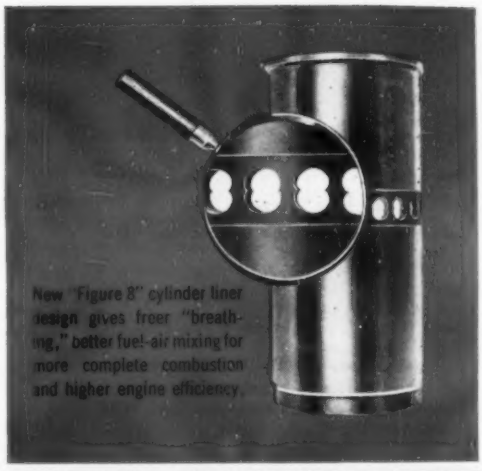
In off-highway trucks this combination means better hill-climbing, more trips per day, bigger pay loads.

In shovels it means faster digging and loading, more yardage, lower maintenance costs.

In drilling rigs it means more hole per day, faster round trips.

In tractors it means more power for pulling, pushing or "dozing."

Get full details on the new, more powerful GM Series 110 Diesels from your GM Diesel distributor. Have him show you that GM Diesels cost less to buy, less to run and less to maintain than any other Diesel.



New "Figure 8" cylinder liner design gives freer "breathing," better fuel-air mixing for more complete combustion and higher engine efficiency.

New high-valve long-life unit injectors meter precise amount of fuel needed to meet load demand. Other engineering improvements include full-flow oil filters,* new idler gear mounting, new injector linkage, higher engine speeds. *optional

GM
GENERAL MOTORS
DIESEL POWER

DETROIT DIESEL
ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 864 H.P.

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San Diego 1, Elec. & Diesel Service Co., 1254 Kettner Blvd.
San Francisco 3, Furrer & Uster, Inc., 225—7th St.
San Francisco 3, H. G. Makelim Magneto Repair Co., 1583 Howard Street
Wilmington, Diesel Control Corporation, 218 North Marine Ave.

COLORADO
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FLORIDA
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Rock Island, Lohse Automotive Service, Inc., 430 North Capitol Ave.

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Indianapolis, Gulling Auto Electric, Inc., 450 North Capital Ave.

IOWA
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Des Moines 9, Electrical Service & Sales Co., 1313 Walnut Street

KENTUCKY
Louisville, Ellingsworth Auto Electric Co., 1003 East Broadway

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New Orleans 13, John M. Walton, Inc., 1050 Carondelet Street
Bossier City, Vaughan Tractor & Auto Parts Co., 605 West Street
Mail Address: P.O. Box 661, Shreveport, La.

MARYLAND
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MASSACHUSETTS
Newton Upper Falls, W. J. Connell Co., 210 Needham St., Newton Industrial Center

MICHIGAN
Detroit 2, Knorr-Maynard, Inc., 5743 Woodward Ave.

MINNESOTA
Minneapolis 6, Diesel Service Co., 2509 East Lake Street
Minneapolis 2, Reinhard Bros. Co., Inc., 11 South 9th Street

MISSOURI
Kansas City 8, Electrical & Magneto Service, Inc., 2538 Grand Avenue
St. Louis 23, Diesel Fuel Injection Service Co., 9331 South Broadway

NEBRASKA
Omaha 2, Carl A. Anderson, Inc., 16th and Jones St.

NEW JERSEY
Newark 2, Tire Trading Co., 239 Halsey Street

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Brooklyn 16, E. A. Wildermuth, Inc., 1102 Atlantic Avenue
Buffalo 8, Hettrich Electric Service, 1032 Ellicott St.
Syracuse 4, F. A. Crossman, Inc., 943 Genesee St.
Troy, Ehrlich Electric Service, Inc., 200 Fourth St.

NORTH CAROLINA
Raleigh, Diesel Injection Service, 3015 Hillsboro Road

OHIO
Cleveland 14, Cleveland Ignition Co., 1301 Superior Ave., N. E.

OKLAHOMA
Tulsa 3, Magneto Ignition Co., 701 West 5th St.

OREGON
Portland 14, Automotive Products, Inc., 1700 Southeast Grand Ave.

PENNSYLVANIA
Hazelton, Penn Diesel Service Co., No. Church at 27th St.
Philadelphia 32, J. W. Parkin, Jr., 2251 North Broad Street
Pittsburgh 13, Automotive Ignition Co., 6358 Penn Avenue

TENNESSEE
Memphis 4, Automotive Electric Service Co., 982 Linden Ave.

TEXAS
Corpus Christi, Womack Bros., 1302 Caldwell
Dallas, Beard & Stone Electric Co., 3909 Live Oak Street
El Paso, Reynolds Battery & Magneto Co., 801 Myrtle Ave.
Houston 1, Beard & Stone Electric Co., Milam at Polk Street
Houston 11, Magneto & Diesel Injector Service, 6931 Navigation Blvd.
Odessa, Electric Service & Supply, 1601 North Grant Street
San Antonio, Womack Bros., 123 West Carolina

UTAH
Salt Lake City 2, Diesel Electric Service & Supply Co., 58 East 7th, South

VIRGINIA
Norfolk, Diesel Injection Sales & Service, 808 Union Street
Richmond 20, Charles H. Woodward Electric Co., 709 Broad Street
Salem, Diesel Injection Sales & Service, 814—8th Street

WASHINGTON
Seattle 1, Seattle Injector Co., 2706 Second Ave.
Seattle 14, Sunset Electric Co., 300 Westlake, North
Spokane 8, Sunset Electric Co., North 703 Division Street

WISCONSIN
Milwaukee 2, Wisconsin Magneto Co., 918 North Broadway

Canada

ALBERTA
Calgary, Hutton's, Ltd., 131—11th Avenue, West

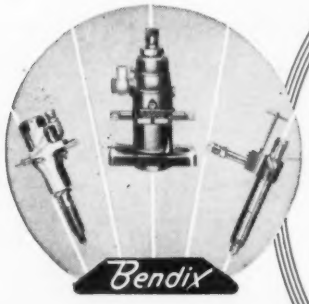
BRITISH COLUMBIA
Vancouver, Magneto Sales & Service, Ltd., 126 Gore Avenue

NEWFOUNDLAND
St. John's, A. H. Murray & Co., Ltd.

QUEBEC
Montreal, International Electric Co., 1037 Bleury Street

Alaska

ALASKA, TERRITORY OF
Anchorage, Reeve Alaska Airmotive, Merrill Field, P.O. Box 1160



A NATION-WIDE *Authorized* SERVICE ORGANIZATION

Bendix

FUEL INJECTION EQUIPMENT

SCINTILLA DIVISION of Bendix AVIATION CORPORATION
SIDNEY, NEW YORK
Western Offices: 582 Market Street, San Francisco 4, California • Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N.Y.

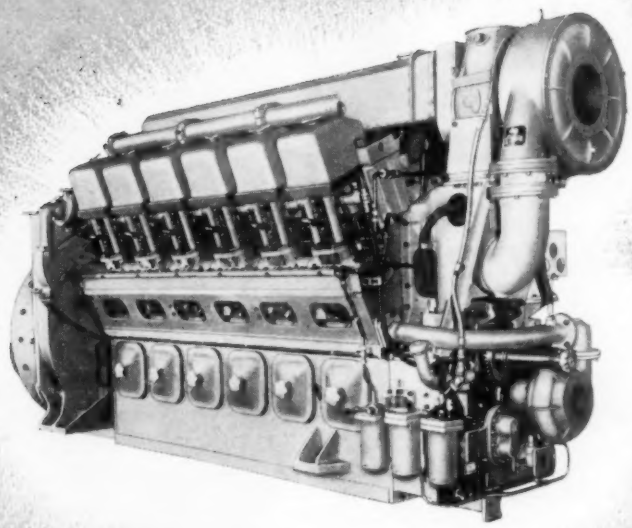
SPECIFICATIONS

Sizes: 12- or 16-cylinder • Bore: 9" • Stroke: 10½"
Cycles: 4, turbocharged
Horsepower: from 1100 at 720 rpm to 2040 at 1000 rpm
Net weights (engine only):
12-cylinder: 31,365 lb dry, 32,965 lb wet
16-cylinder: 37,000 lb dry, 38,996 lb wet

TYPICAL APPLICATIONS

Crude Oil Pipeline Pumping
Products Pipeline Pumping
Electric Power Generation
Irrigation Pumping
Dredging
Portable Units Mounted on Skids

the ALCO heavy-duty, lightweight



9" x 10½" engine for continuous or stand-by service in stationary or portable installations!

Here's the diesel engine you've been waiting for—the latest addition to a line long famous in every quarter of the globe.

It's the heavy-duty, lightweight 9" x 10½" ALCO . . . a single source of low-cost, dependable power for a wide range of applications—continuous or stand-by, stationary or portable.

Look at the partial list of specifications, applications and special features above and at right. See if you don't agree that the all-purpose Alco is the answer to your toughest, costliest diesel-engine problems.

For more information fill out and mail attached coupon. We'll send you promptly a free copy of our Bulletin DE-4, giving complete details.

ALCO DIESELS

AMERICAN LOCOMOTIVE COMPANY

Sales and Service Offices in Principal Cities

SPECIAL FEATURES

Engine base and frame of structural steel—for light weight, greater strength, more economical foundations.

Compact design—saves floor space.

All wearing parts easily accessible for maintenance.

Lube-oil sump, circulating-water pump, and lube-oil pump are integral parts of engine—thus reducing installation costs.

Air-motor engine starting, using as low as 60 lb air.

Turning gear—built into engine for use with commercial air motor.

Free end of engine has extension shaft for driving auxiliaries (fan compressor, etc.).

AMERICAN LOCOMOTIVE COMPANY
Schenectady 5, N. Y.

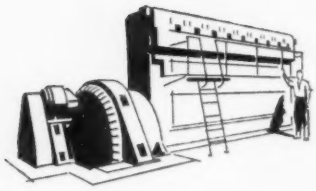
Gentlemen:
Please send me a copy of your Bulletin DE-4 giving complete details on the heavy-duty, lightweight ALCO diesel engine.

Name_____

Company_____

Street_____

City_____ Zone____ State_____



"Cured... bearing failure in their diesel-driven, front-end loaders"

A large fire-brick manufacturing company in the Philadelphia area had the problem of premature bearing failure in its diesel-driven loaders and shovel.

Headlights on even in daylight...

Sinclair Lubrication Engineer Harry Donovan reports, "These units were operating around the clock under conditions *so dusty that headlights were required.* Crankcases had to be drained and flushed bi-weekly! My first recommendation was closer adherence to an air filter maintenance program."

Drain intervals doubled!

Mr. Donovan continues, "Further observation proved to me that excessive idling and overloading were all contributing factors to a severe sludge condition. I recommended Sinclair SUPER TENOL® – explaining that the superior quality of the base oil plus the Sinclair formulated additives would extend bearing life *while at the same time removing accumulated lacquer and sludge.* A trial period proved SUPER TENOL doubled drain intervals and eliminated flushing entirely. This company now uses Sinclair SUPER TENOL exclusively."

Why not give a Sinclair Lubrication Engineer the chance to solve *your* lubrication problems? *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

"Every time I open my mouth these days, someone always butts in to talk about something called Re-Powered with O-P."

There is a lot of talk these days—ashore and at sea—about the boats that have been repowered with the newest in marine diesel power—the new Fairbanks-Morse Opposed-Piston engine in the 225 to 750 horsepower class.

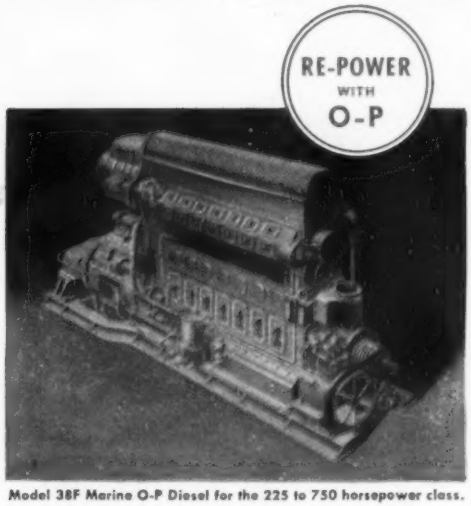
This new O-P is specifically designed to put more power, more speed . . . more performance in your present engine space. Hard to believe? Listen to this: This engine is 20% less in length and width . . . weighs about 20 pounds per horsepower . . . has 40% fewer moving parts . . . and because it is a completely packaged unit, can be fitted for about ⅓ the cost of other replacement units.

There's more to the Model 38F story—lower maintenance, reliability and economy. So call your Fairbanks-Morse Marine Specialist now—you'll be glad you did. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS



Model 38F Marine O-P Diesel for the 225 to 750 horsepower class.

For power in emergencies

Delco Generators

Ideal for use with Diesel power, Delco generators provide a power range of 20kw through 200kw, A.C. or D.C., 1200, 1500 and 1800 rpm.

Hospitals, public buildings, factories, construction jobs, circuses, carnivals, and many others must frequently call upon such independently powered utilities for stand-by or portable use.

Delco generators deliver dependable power—both adequate and unfailing.

Adaptable to most engines. Flexible driving disc. Standard S.A.E. mounting.

Any of the sales offices listed below will be glad to supply detailed information.

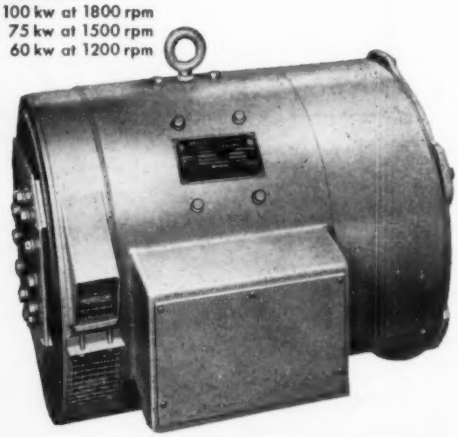
DELCO PRODUCTS

DELCO DAYTON, OHIO

Division of General Motors Corporation, Dayton, Ohio

A.C. GENERATORS
20 kw through 150 kw at 1200 rpm
20 kw through 200 kw at 1800 rpm

D.C. GENERATORS
20 kw through 100 kw at 1800 rpm
20 kw through 75 kw at 1500 rpm
20 kw through 60 kw at 1200 rpm



SALES OFFICES:

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So you mail this coupon . . . what happens?

CEDAR RAPIDS ENGINEERING CO.
918 17th St. N.E., Cedar Rapids, Iowa

Tell me more about this remarkable new valve facing machine.

☐ Send literature.

☐ Have your representative come in and demonstrate the Super-Matic—at no cost or obligation.

Name _____

Company _____

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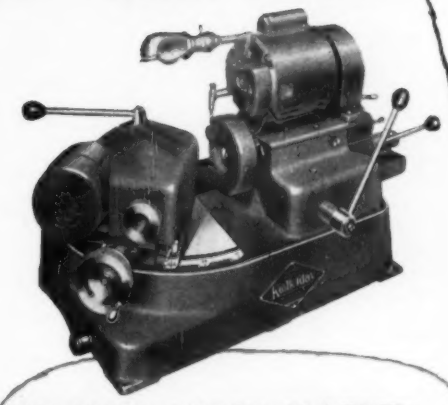
City _____ State _____

it can help you

CUT YOUR OVERHEAD COSTS
IMPROVE YOUR SERVICE

We want you to see for yourself why there's so much interest in the brand new 1954 Kwik-Way Super-Matic Valve Facing machine. Because it makes it so quick and easy to do perfect valve facing work, we say the new Kwik-Way Super-Matic will improve the efficiency of your shop enough to substantially cut your overhead costs. Why not let us prove it.



THE NEW 1954 KWIK-WAY SUPER-MATIC

- extreme accuracy
- superior finish
- smooth, easy operation
- Micro-switch operating controls
- precision built, lever operated, 6-ball compound chuck
- chuck capacity 7/32" to 5/8"
- extra power with dual motors
- improved coolant system
- dove-tailed, handscraped ways with adjustable gib
- pre-lubricated, sealed bearings on grinder spindle
- rugged construction. Built to highest standards for fine machine tools

See and operate the Super-Matic in your shop. Absolutely no obligation.

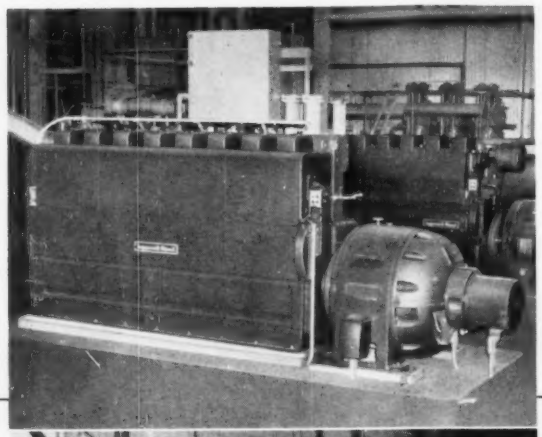
MAIL THIS COUPON TODAY!

Kwik-Way

Serving the motor rebuilding industry since 1920

Heavy-Duty Diesels...

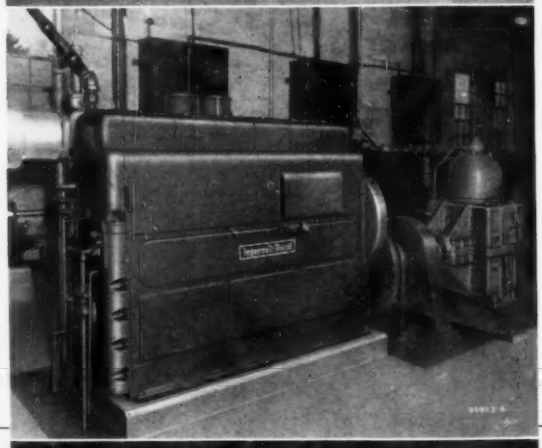
all designed for continuous full-load operation



Two 8 cylinder Ingersoll-Rand Type S Diesel Engines

The I-R type "S" is a 4-cycle, heavy-duty, medium-speed diesel engine with a fuel consumption of only 0.38 lbs per bhp-hr at full load. It has a bore of 10½ inches and a stroke of 12 inches. Speed is 720 rpm for driving 60-cycle generators and 750 rpm for 50-cycle and mechanical drive. It is available with 6, 7, or 8 in-line cylinders and rated at 450, 525 and 600 hp.

The type "SS" is a turbo-charged "S" and provides maximum economy of space and weight by producing more than 50 percent more power than unsupercharged engines. Available in 6, 7, and 8 sizes from 710 to 1000 hp.

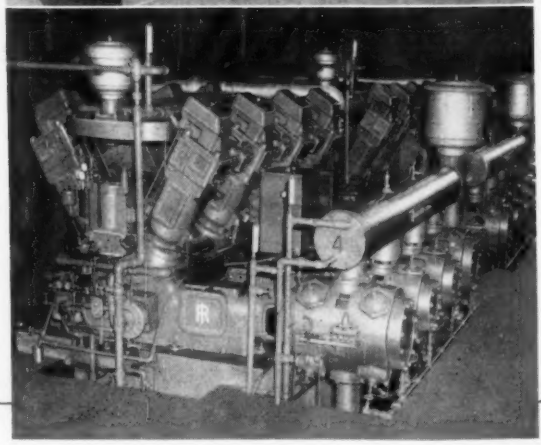


An Ingersoll-Rand 6 cylinder TS Diesel Engine driving an I-R vertical water pump through right-angle gears at a paper mill.

Ingersoll-Rand's TS diesel engine is a smaller, lighter-weight engine built with all the longlife features, stamina and dependability of big engine design. It is 7 inch bore, 8½ inch stroke diesel with a fuel consumption of only 0.40 lbs per bhp-hr, but weighs about 30 lbs per hp.

Features include: big 5¼" crankshaft, full-floating aluminum-alloy bearings—full pressure lubrication, individual cylinder heads, replaceable liners, removable valve-seat inserts, large single-hole injection nozzles, gear-driven supercharger and many others.

Available with 6 or 8 in-line cylinders and delivering 200 to 375 continuous hp at 900-1000 rpm.



An I-R Diesel-engine-driven air compressor with 8 power cylinders and 4 compressor cylinders on a construction project.

Ingersoll-Rand Diesel-powered compressors combine a heavy-duty 4-cycle diesel engine and a heavy-duty, double-acting compressor in a single, compact machine that's easy to install and relocate. They assure maximum compressed air output per pound of fuel. With one gallon of fuel oil, these units compress 5600 cu ft of air to 100 lb pressure.

They are available with compressor cylinders for any pressure or vacuum in a range of sizes up to 440 hp.

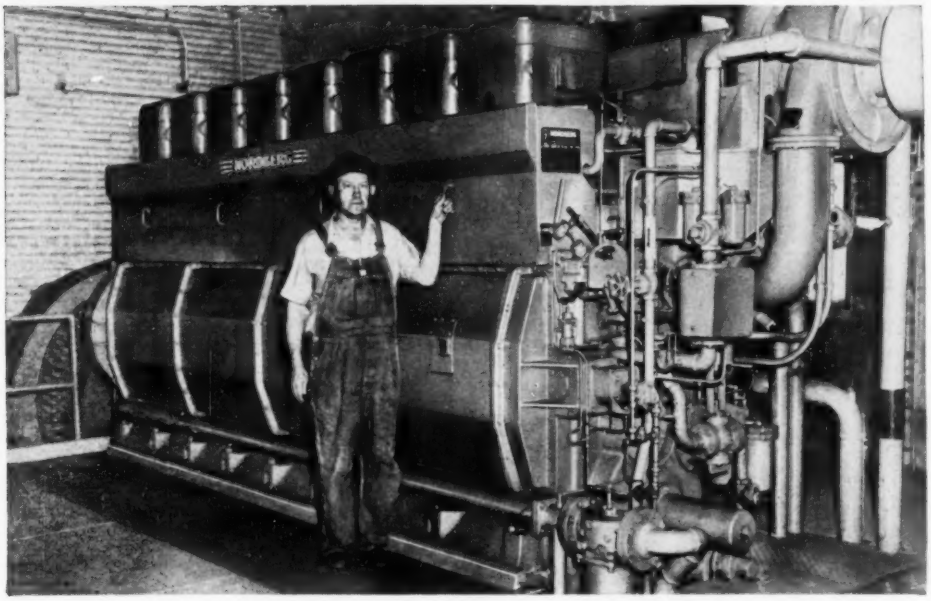
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 942A-7

Starting Air Compressors • Hoists
Impactools • Starting Air Motors

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO-BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL & GAS ENGINES

This engine maintains a lubricating oil economy of approximately 18,000 H.P. hrs. per gallon



Koppers Porous Chrome* Rings. Porous chrome surface holds and distributes oil during break-in. Seats quickly. Chrome prevents grit from embedding in ring surface. Prevents cylinder wall scratching. Reduces wear 50%. Lasts 4 times longer than other rings.

Here's operating efficiency as it has been proved at the Municipal Power Plant, Lindsay, Oklahoma.

A lot of the lubricating oil economy can be credited to the piston rings installed in this Nordberg Duafuel engine. They are Koppers American Hammered Piston Rings. (Porous Chrome*, Tapered O. D., and Grooved Oil Cutter Rings.)

Many manufacturers of diesel and pumping machinery insist on Koppers Rings for their equipment because they know that Koppers Rings make for satisfactory performance.

Test after test also prove that, when Koppers Rings are used for replacements, operating efficiency, and economy are markedly increased . . . often doubled. And Koppers Rings last so much longer that labor costs and costly down-time for repairs are greatly reduced.

So, to save on lubricating oil, to cut down costs, to help save on fuel, remember Koppers. Next time you have an overhaul, think of Koppers first. We are always ready to consult with you on your specific piston ring problems. And for the latest information on Koppers Rings, mail the coupon below.

Koppers Oil Cutter Rings maintain high unit pressure on the oil film. Seats rapidly. Slots in back of ring permit oil collected in channel on down stroke to flow into interior of piston. Proved efficient in thousands of installations. Extremely popular in vertical compressors and internal combustion engines.

*Van der Horst Process

KOPPERS®

AMERICAN HAMMERED
Industrial Piston Rings

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • Baltimore, Maryland

This Koppers Division also supplies industry with Fast's Couplings, Aeromaster Fans, Koppers Electrostatic Precipitators and Gas Apparatus.

***Engineered* Products Sold with Service**

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Gentlemen: Please send me free 16-page booklet containing full information on Piston Rings.

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Company.....

Address.....

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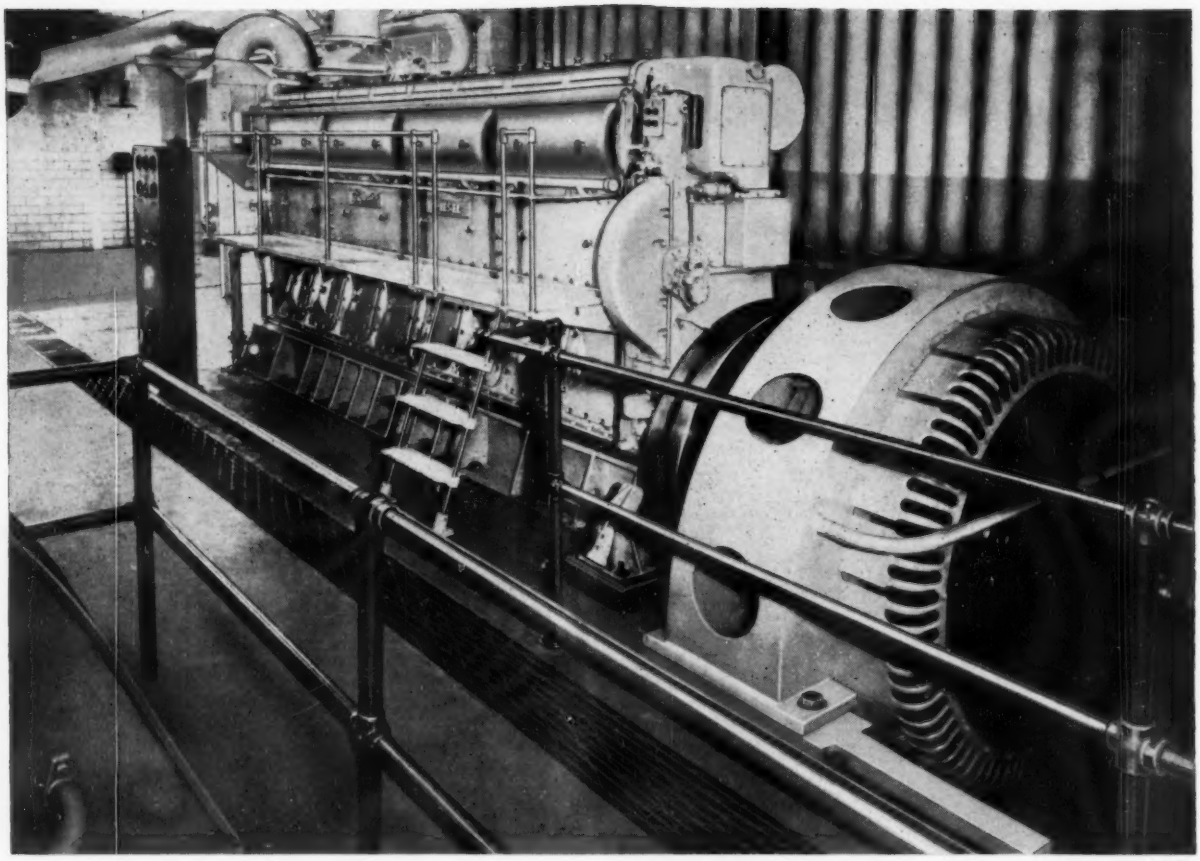

Not yet "broken in"... but producing over 14 K.W.H. per gallon!

That's the report on this new Superior Model 65 Diesel recently installed in the Petoskey, Michigan, power plant. This record of high level performance at low operating costs—even under widely oscillating load—is typical of the Model 65.

Designed to pack more horsepower into less weight and space, this Superior Model 65 keeps building and installation costs down. You'll find that fuel costs are low, too, especially when it's equipped for dual-fuel operation. By simply pushing a button, you can switch between diesel and sewage (or other by-product) gas.

There's long life in the structure of the Model 65, too. From its heavy-duty, welded steel block to its alloy iron cylinder heads and advanced fuel system, you'll find only the finest in materials and craftsmanship—the quality that only its maker's 100 years of engine building experience can provide.

Whether you're interested in diesels for generator, pump, or other drives, you'll want complete facts on the Superior Model 65. Just write or stop in at the nearest office listed below.

IMPORTANT FEATURES OF THE SUPERIOR MODEL 65

- Fuel economy is a fact with this precision-built 4-cycle heavy-duty engine. Improved combustion and scavenging are two of the reasons.
- Long-lived Superior engines consistently produce lowest overall power cost, by fewer parts replacements and lower maintenance.
- All models can be specified for Dual Fuel operation (by-product gas and diesel fuel oil).
- Maximum accessibility to all operating parts for simple and easy maintenance.
- Available in both 6 & 8 cylinder models, naturally-aspirated or supercharged.
- Size to fit any need from 420 to 1250 KW, or 580 to 1765 BHP.

DIESEL DUAL FUEL GAS — THE NATIONAL SUPPLY COMPANY — ATLAS Imperial DIESEL ENGINES — Superior ENGINES — DISTRIBUTOR OF Lister DIESELS IN U.S.A.

THE NATIONAL SUPPLY COMPANY

ENGINE DIVISION PLANT AND GENERAL OFFICES: SPRINGFIELD, OHIO

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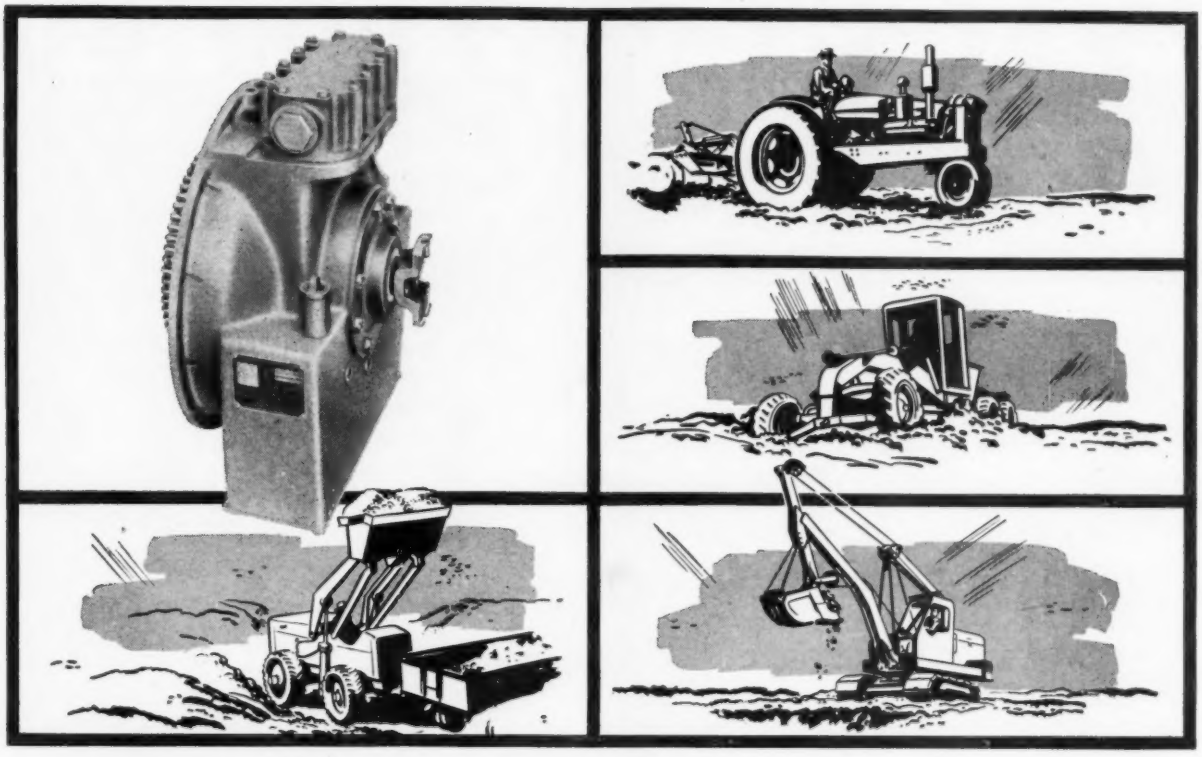


NEW TORQMATIC CONVERTERS FOR GASOLINE-OR DIESEL-POWERED EQUIPMENT

* EASY TO INSTALL
* COMPACT
* LOW-COST

YOUR 40- to 150-horsepower industrial and automotive engines and equipment will last longer, perform better, with a low-cost heavy-duty Allison TORQMATIC Converter protecting engines and drive lines from harmful shock loads.

And manufacturers now are offering this shock-free power transmission in their models with little or no change in equipment design.

The new Series 200-300 TORQMATIC Converters *are priced to compete* with converters designed primarily for passenger cars—*sell for less than* most comparable industrial units.

And the new *completely self-contained* TORQMATIC Converters take up little more space than conventional clutch power take-offs—have standard SAE #3 engine mountings to fit any gasoline or Diesel engine in their range.

Many options, including front disconnect clutch and adapter, rear disconnect clutch adapter, standard flange, industrial shaft with or without governor drive, permit installation in a wide range of hard-working units. For full details on how easy TORQMATIC Converters are to install in your equipment, ask your equipment dealer, manufacturer or fill in the coupon and mail to:

Allison Division of General Motors
Box 894S, Indianapolis 6, Indiana

GM GENERAL MOTORS Allison TORQMATIC DRIVES

Allison Division of General Motors
Box 894S, Indianapolis 6, Indiana

Please send me Bulletin SA 1031.

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____

2 BIG NEW 9600 H.P.

Talk about modern power plant operation . . . visualize a comfortable, air-conditioned control room, separated from the main engine room by plate glass, in which one operator scans special gauges, panels, warning lights and push-buttons . . . and from this one station, easily controls the operation of two of the largest Diesel engines ever built in the Western Hemisphere.

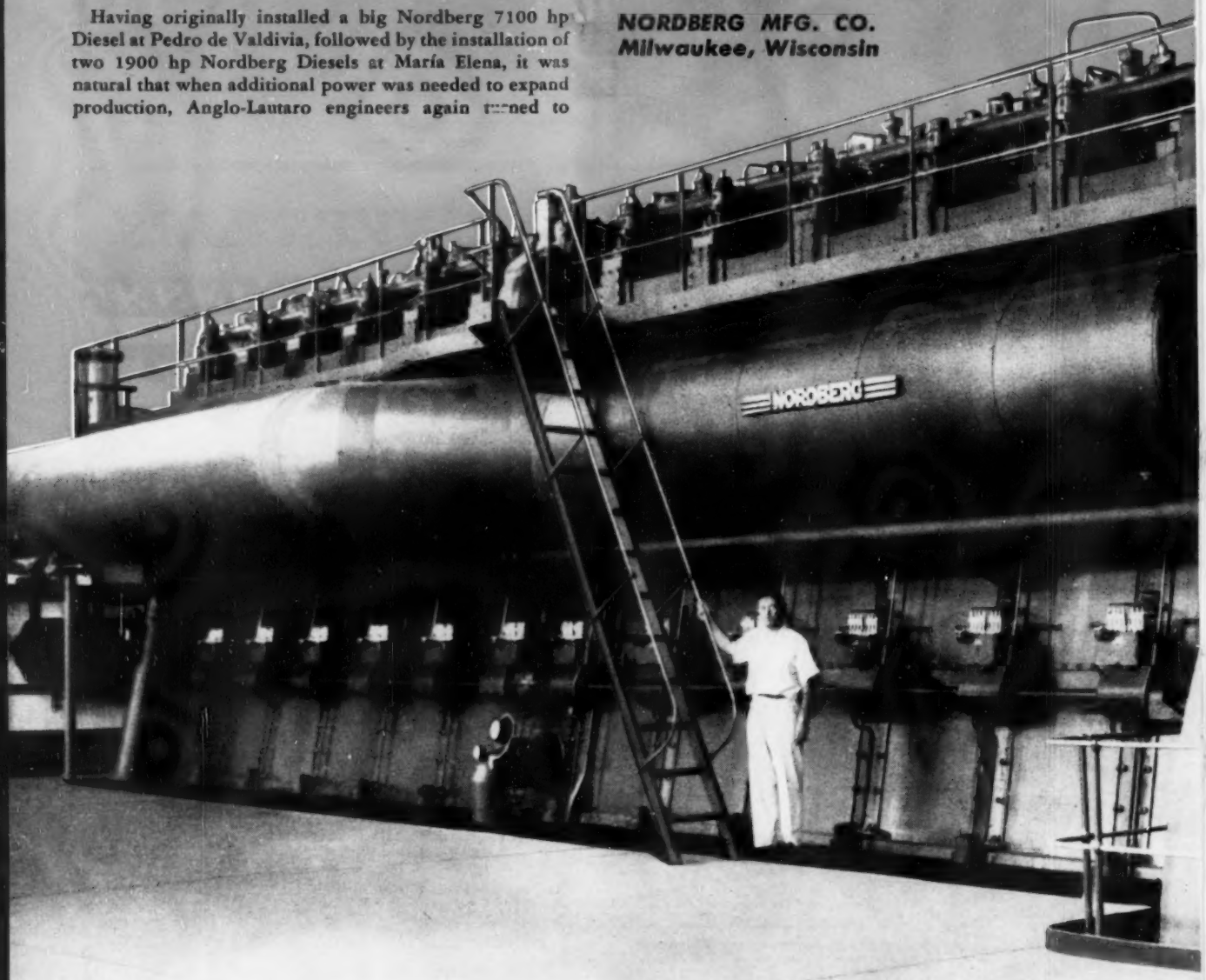
This is the story of the modern new Diesel power plant recently completed by the Anglo-Lautaro Nitrate Corporation at Coya Sur, in the heart of their vast nitrate operations, located between the María Elena and Pedro de Valdivia plants in northern Chile. The new Coya Sur power plant forms part of a three-plant network whose combined generating facilities provide a total of 46,000 kilowatts for nitrate production.

Having originally installed a big Nordberg 7100 hp Diesel at Pedro de Valdivia, followed by the installation of two 1900 hp Nordberg Diesels at María Elena, it was natural that when additional power was needed to expand production, Anglo-Lautaro engineers again turned to Nordberg for the efficient, economical solution to their current power problem.

The problem of providing the much needed additional power has now been confidently assigned to two 12-cylinder, 29" bore x 40" stroke Nordberg 2-cycle Diesel engines, each having a sea-level rating of 9,600 bhp, corresponding to 8,950 bhp at the installed altitude of 4,166 feet. Each big engine drives a totally-enclosed General Electric generator rated 8,750 kva, 7,000 kw at 80% P.F.

Employing not only two of the largest engines in the Western Hemisphere, but the most modern concepts of power plant design and operation, the new Coya Sur Diesel plant is a striking example of the way modern industry is being served by efficient, economical Nordberg Engines.

NORDBERG MFG. CO.
Milwaukee, Wisconsin

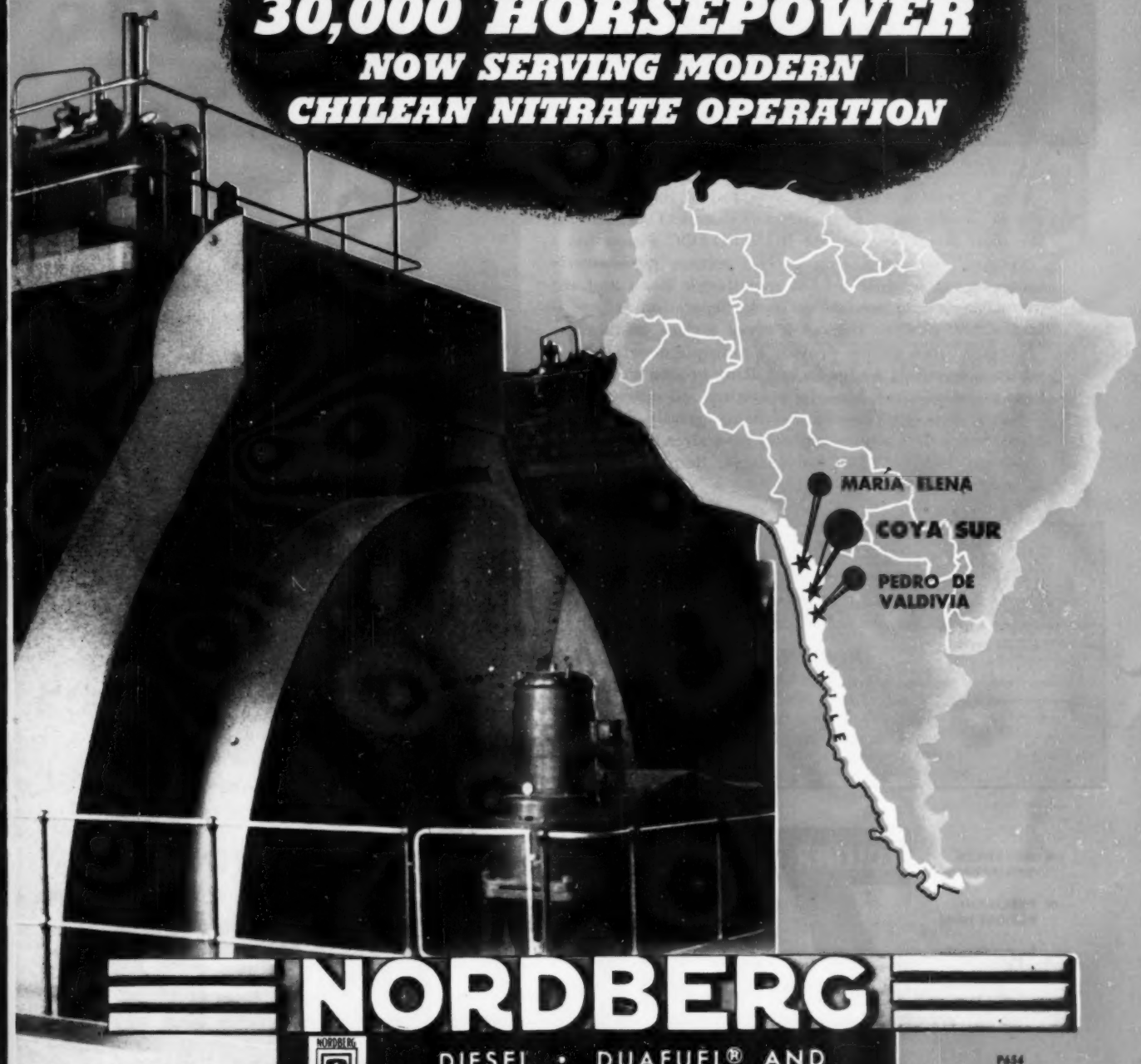


BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY DUTY ENGINES . . . 10 TO OVER 10,000 H.P.

NORDBERG DIESELS

FOR ANGLO-LAUTARO NITRATE CORPORATION

FIVE NORDBERG DIESELS TOTALLING MORE THAN 30,000 HORSEPOWER NOW SERVING MODERN CHILEAN NITRATE OPERATION



NORDBERG

DIESEL • DUAFUEL® AND SPARK-FIRED GAS ENGINES

P654

SENSATIONAL MILEAGE

STOPS! RING GROOVE WEAR

Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock

ZOLLNER

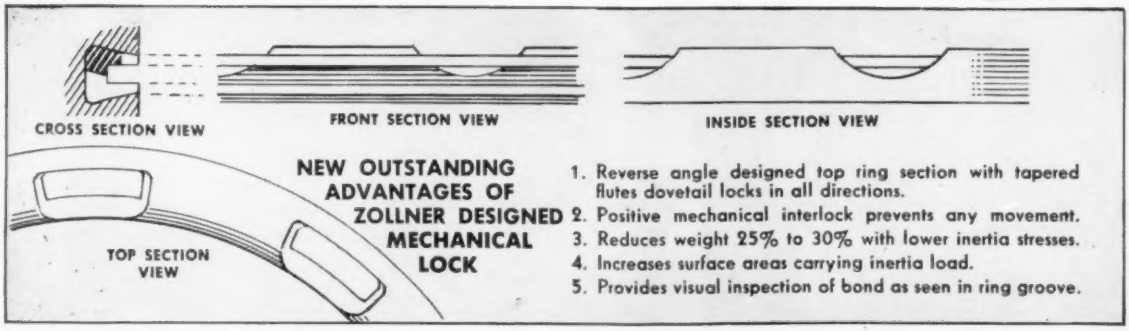
"Ni-Resist" Iron Top Ring Section

BOND LOC*

For Extra Heavy Duty Service

PISTONS

Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section *permanently* incorporated by *both* Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879 * T. M. Reg. Pat. App. For

- ADVANCED ENGINEERING
- PRECISION PRODUCTION

in cooperation with engine builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana

Assemble Aeroquip Hose Lines Right in the Field...

IN MINUTES!

Quick Replacement of Fuel, Lube, Air and Hydraulic Lines Keeps Equipment on the Job!

The difference between minimum downtime and wasted hours often depends upon the speed with which a damaged fuel, lube, air, or hydraulic line can be replaced. If you operate mobile equipment, Aeroquip bulk hose and detachable, reusable fittings will provide a compact, portable inventory that meets all your hose line replacement needs.

You can make assemblies on the spot by cutting bulk hose to required length and attaching the reusable fittings. This "Aeroquip Idea" gets equipment back on the job *fast*. For information, see your Aeroquip distributor or write us.

Edmier, Inc., one of Chicago's leading firms dealing in excavating, grading and construction materials hauling, operates more than 100 trucks and a large number of construction machines. To help reduce downtime, a supply of Aeroquip bulk hose and reusable fittings is on hand at all times.

Hose line replacements are made as they are needed. Here, Orville J. Wiley, Edmier Maintenance Foreman, reuses an Aeroquip fitting to make a new assembly for a Hough Payloader. Aeroquip hose line replacements are used for hydraulic systems on trucks and construction equipment, air systems on drag lines and cranes, and for greasing equipment in maintenance shops.

It takes only a few minutes to get the Payloader back on the job. Says Mr. Wiley: "There isn't any doubt that Aeroquip hose can withstand more abuse and flexing than any other hose we've ever used. Safety wise, it's the best. Not only has Aeroquip cut our maintenance replacement cost in half, it has also contributed a great savings in downtime and hydraulic oil loss."

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. Portland, Ore. • Van Wert, Ohio • Wichita, Kan • **IN CANADA:** Prenco Progress and Engineering Corporation Ltd., Toronto **IN ENGLAND:** Super Oil Seals & Gaskets, Ltd., Birmingham

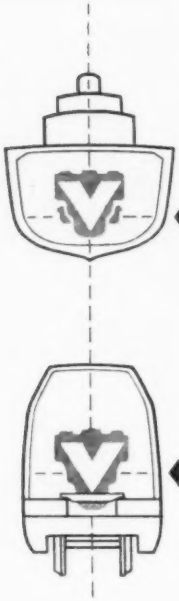
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

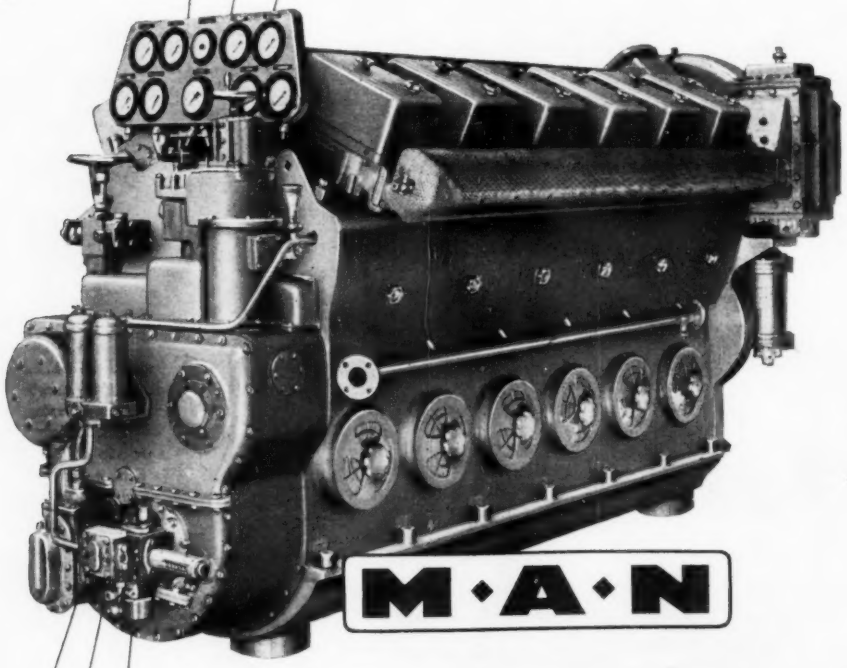
V DIESEL

are being used to an ever increasing degree for the drive of locomotives and special water craft.

We are building engines of this type, with high super-charging and low weight per H. P., developing up to 3500 HP in "V" arrangement.

Leaflets No. D 36 4456 E and D 36 4271 E are at your disposal

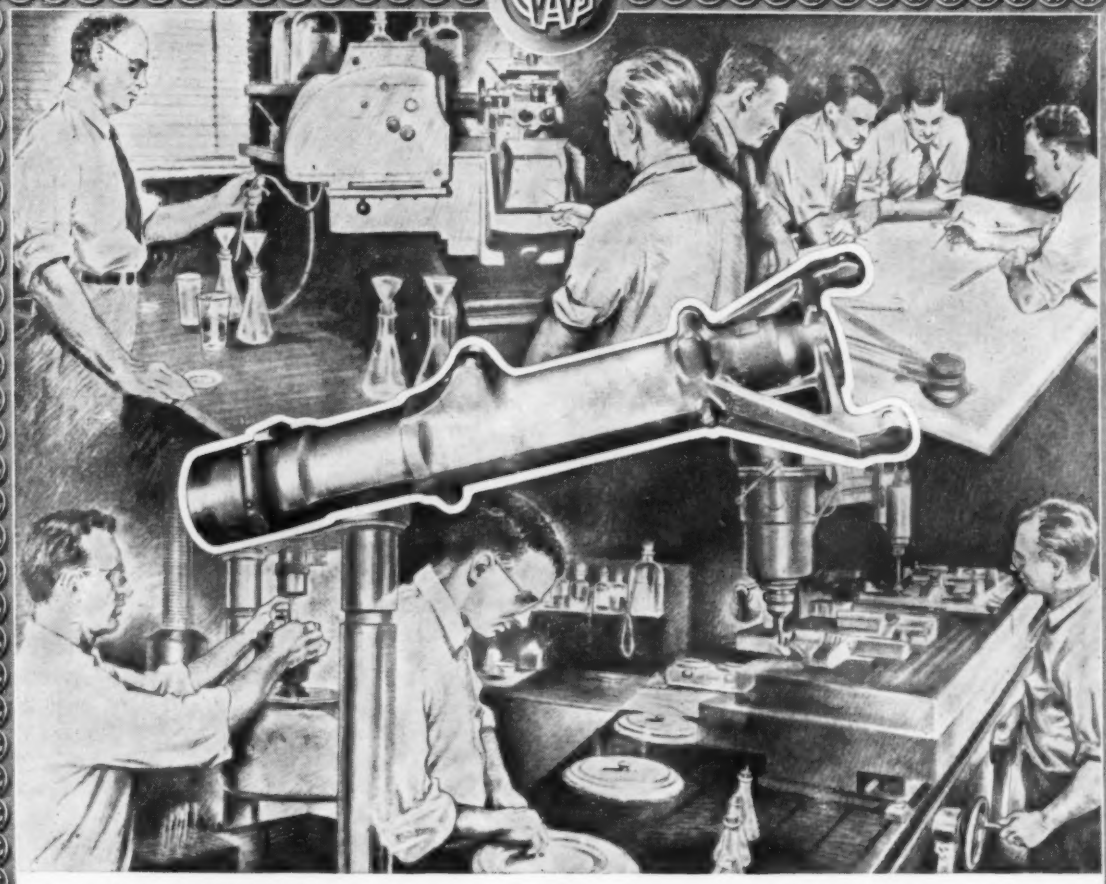




M·A·N

MASCHINENFABRIK AUGSBURG-NÜRNBERG AG · WERK AUGSBURG

We are represented in all countries. Please ask for name and address of your local representative.



FORGING TECHNICIANS—Yes, that is the compliment paid us by those acquainted with our services. In back of each design is a thorough understanding of engineering and metallurgical needs before production begins . . . assuring forgings of maximum physical properties and uniform quality

THE LANDING GEAR FORGING illustrated, nearly five feet long, is an important component for a modern military fighter . . . another example of Wyman-Gordon's technical contribution to aircraft.

There is no substitute for Wyman-Gordon experience

WYMAN-GORDON

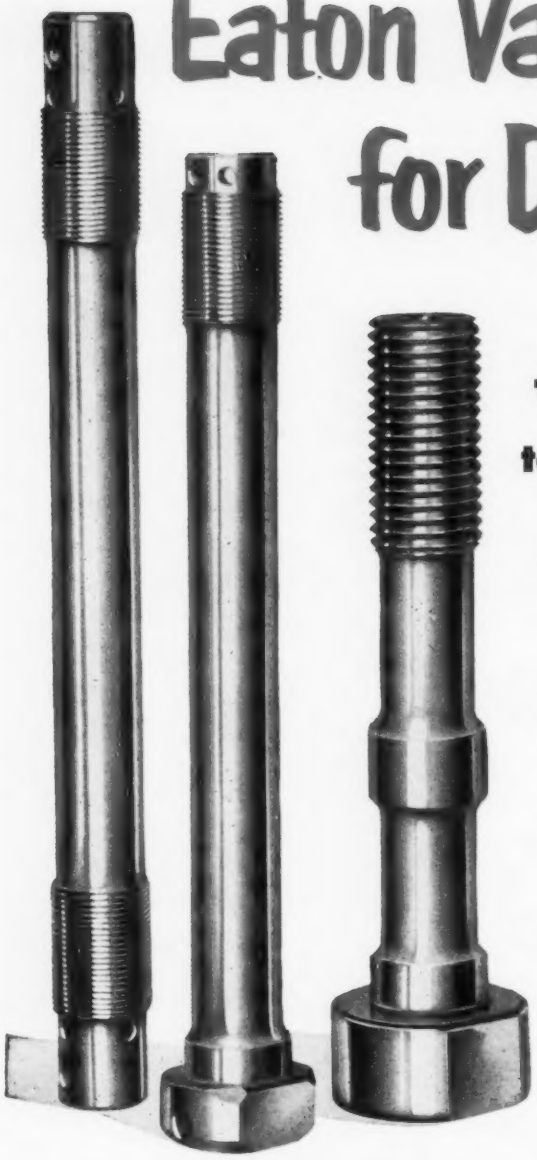
Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

Eaton Valves and Bolts for Diesel Engines



Reflect the Experience of Thirty-Five Years as a Supplier to Leading Diesel Engine Builders

- **Years of forging experience, plus the most modern forging equipment**
- **Heat treatments under strict metallurgical control**
- **Highly specialized precision production facilities**
- **Rigid adherence to customer specifications**

EATON

EATON MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD · DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

SINCE 1864
DEUTZ
Diesel
3-1800 H.P. air- and water-cooled
for Road vehicles, Rail vehicles,
Watercraft, Working machines •
Marine engines also direct reversing
for all waterways • Diesel-tractors 11 · 15 · 30 · 45 · 60
H.P. Diesel-locomotives • Generator sets
air- and water-cooled
for lighting current
and power stations
stationary and mobile
KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN
Distributors and Dealers Wanted
Germany
General Representative for U.S.A.
The Diesel Energy Corporation

Wear Control

VAN DER HORST
TRADE MARK

Here's a proven way to bracket your Diesel cylinder wear costs and clamp them down to a minimum. The same can be done for compressors.

Just send your worn liners and cylinders to Van der Horst. If they've already been oversized to the limit, that doesn't matter. We can plate them all back to original bore dimensions with VANDERLOY M.

This pure electrolytic iron bonds atomically and can be developed a quarter of an inch thick, if that's essential.

Over the VANDERLOY M we plate PORUS-KROME*. It makes cylinders last as much as four times longer than they did when new and unprocessed.

Then, back they go, ready to give you efficient and dependable service, until at long last they need another Van der Horst processing.

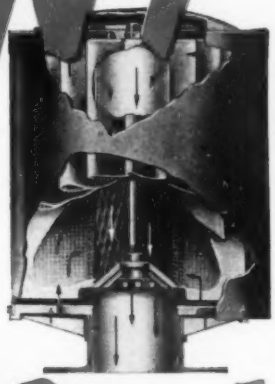
Since the cost for all this is surprisingly less than the price for new, unprocessed replacements, we think you'll want to know more about our wear control method. Why not drop us a line? W52-1D

* *PORUS-KROME is a dense, hard, wear and corrosion-resistant chromium, produced by the Van der Horst Corporation of America, and which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.*

U. S. PATENTS
2,048,578, 2,314,604 and 2,412,698

VAN DER HORST CORPORATION • OLEAN, N. Y.

MOST EFFICIENT FILTER MONEY CAN BUY!



MODEL D
Intake Filter

STAYNEW INTAKE FILTERS

WHEN BUYING INTAKE FILTERS, you look first for efficiency. And, in Staynew Intake Filters, your dollars buy the MOST EFFICIENT INTAKE FILTER MADE!

They're *dry* . . . absolutely no oil carry over and no oil blow out on free air unloading equipment. They provide *maximum filtering area* in the smallest possible space. And they are *rugged!* Even under the most severe conditions Staynew Intake Filters perform a year or more *without attention.*

Get all the facts, and you'll buy Staynew Dry Type Intake Filters for the life of your engines.

The Staynew Principle is explained in Bulletin S.I.F. Write today!

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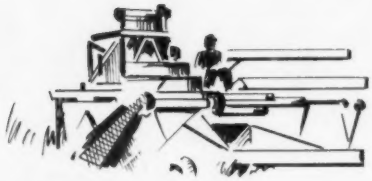
DOLLINGER CORPORATION

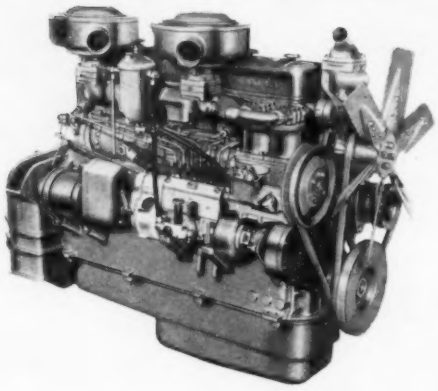
10 Centre Park Rochester 3, N. Y.

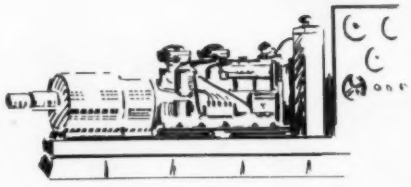
Representatives in Principal Cities

ALL TYPES OF FILTERS
FOR EVERY INDUSTRIAL NEED

HENSCHEL

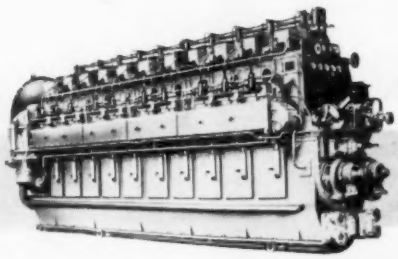






Conversion Diesel engines 20 to 250 hp suitable for any commercial vehicles and stationary plants, operating with Henschel-Lovena combustion system.

Henschel 2-stroke cycle Diesel engine Z 55 for marine vessels and stationary plants, output 700-1800 hp



HENSCHEL & SOHN GMBH KASSEL · HENSCHEL MASCHINENBAU GMBH HAMBURG
GERMANY

APF *Diesel fuel injection pumps—*

examples of American Bosch versatility

American Bosch versatility in Diesel fuel injection is demonstrated by the wide variety of APF single cylinder type pumps available . . . for Diesel engines ranging from small and medium size to huge stationary engines of up to 1000 horsepower per cylinder. For instance, special compact and sturdy pumps have been developed having extra pressure capacity for modern high-compression Diesels used in locomotives, boats and similar applications. For dual fuel engines, American Bosch has perfected APF dual plunger pumps that provide injection for either Diesel or gas operation.

The American Bosch line of injection equipment is the most comprehensive in the world. No matter what the requirement, it is probable that American Bosch already produces the appropriate style of pump, nozzle and other injection accessories required . . . *all available without delay in time-tested form.*

The reputation of American Bosch fuel injection equipment is based on quality and the experience gained through many years of development and application work on all kinds and types of Diesel engines. American Bosch Corporation, Springfield 7, Massachusetts.

AMERICAN BOSCH

2404

THE ENGINEER'S REPORT

DATA	
LUBRICANT	RPM Delo Oil R.R.
UNIT	Diesel locomotive
SERVICE	Transcontinental freight—grades to 1.8%
PERIOD	3 years
LOCATION	Minneapolis, Minn., to Wenatchee, Wash.
FIRM	Great Northern Railway

504,851 freight miles in 3 years without overhaul!

ONLY 0.002 INCH WEAR was miked on liners of this locomotive's engines when they were inspected after 504,851 actual miles. Lubricated with RPM DELO Oil R.R., the engines operated without trouble of any kind during 3 years of tough service hauling freight over the Continental Divide. Representative piston and liner, above right, shown as they appeared when taken from one of the engines, demonstrate good condition of parts after this extended service. All rings were free when engine was torn down. Overhaul was performed only because of time and mileage on engine, which was estimated to have idled the equivalent of 100,000 miles in addition to actual mileage. Besides low wear of liners, other wear measurements (inches) were only: Wrist Pin—0.001; Wrist Pin Bushing—0.0015; Carrier Bushings—0.0015; Oil Ring—0.003.

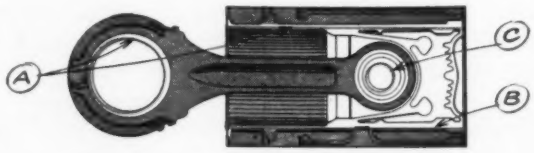
REMARKS: Great Northern Railway's diesels haul heavy freight up grades as severe as 1.8%. Engines operate in dust and heat in summer, snow and extreme cold in winter.

FREE CATALOG: "How to Save Money on Equipment Operation," a booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

At last...a proven better way to kill Diesel Exhaust Fumes!

NEW OCM DIESELER

Cleaner, safer air wherever you run a 4-cycle diesel engine — better control of noxious diesel exhaust fumes — that's what this tremendously important new catalytic invention means to you today.

The OCM Dieseler reduces — below objectionable levels — dangerous hydrocarbons and carbon monoxide in exhausts from all 4-cycle diesel engines. Compact catalytic units "burn out," by catalytic reaction, 65-85% of the unpleasant, harmful fumes — 80-90% of the dangerous carbon monoxide — whenever your engine is operating at over 60% load.

Think what this means almost everywhere diesel engines are used!

Now, with the OCM, it is possible for some mine operators to use standard diesel equipment underground.

Now 4-cycle diesel bus and truck operators can promote better public relations and good will by eliminating foul-smelling smoky exhausts.

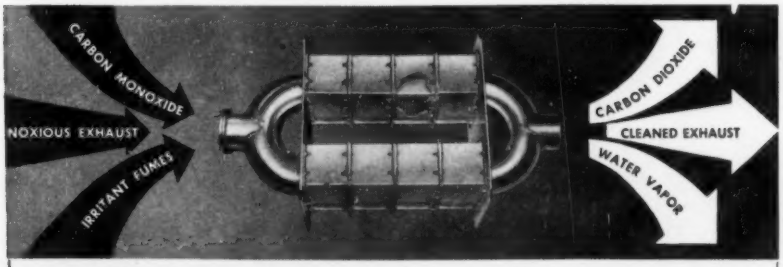
Now both stationary and mobile diesel-powered equipment can run more efficiently in industrial plants.

Requires Little or No Maintenance

The OCM Dieseler is designed to replace any standard diesel muffler. It can be connected to the engine exhaust manifold quickly and easily by your own mechanics. It is strong, compact and rupture proof. Maintenance is practically nil. Tests show that the Dieseler will give you up to 2000-2500 hours of trouble-free service before the catalytic units need renewal. Replacement is simple and low cost.

A Houdry Catalyst

The OCM Dieseler was invented by Eugene Houdry, who developed the catalytic process for cracking petroleum and who is world-renowned in the field of catalytic research. Almost anywhere you use 4-cycle diesel equipment, the OCM Dieseler can bring important benefits to you — in more efficient performance, in increased employee productivity and morale, and often in better public relations as well. Mail the coupon for complete information and technical data now.



OCM Dieseler, Duoflow model. Catalytic units (see cutaway) oxidize irritating, dangerous exhaust fumes and odors to harmless carbon dioxide and water vapor. Uniflow and Quadriflow models also available to equip almost any size engine.

OCM CATALYTIC EXHAUST FOR GASOLINE ENGINES

The OCM Catalytic Exhaust does for any engine burning non-leaded gasoline all that the Dieseler does for diesel equipment.

This Catalytic Exhaust eliminates 95% or more of the carbon monoxide — 90% of the hydrocarbons — from any engine in which you use non-leaded gasoline. With the OCM Catalytic Exhaust you can operate lift trucks, tow trucks, loaders, auxiliary generators in even closely confined areas continuously, efficiently and *safely*. Wherever you use gasoline-powered equipment indoors, you need the OCM Catalytic Exhaust.

OXY-CATALYST, Inc.
WAYNE, PA.

MANUFACTURING • ENGINEERING • RESEARCH

Fume elimination processes and equipment for internal combustion engines—for incinerators—for consumer products—and for industrial air pollution control and heat recovery.

NOTE. Dealerships for both OCM Exhausts are now available in most major markets. Write for full details.

OXY-CATALYST, INC., Wayne, Pa.

Send complete information on ☐ OCM Dieseler; ☐ OCM Catalytic Exhaust for gasoline engines.

☐ I am interested in a dealership

Name_____ Title_____

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Get the BEST SERVICE

For your Marquette HYDRAULIC GOVERNORS

To obtain the maximum in economical governor service, Marquette Governors should be returned to our factory for reconditioning.

Our governor personnel are thoroughly and expertly trained. These skilled mechanics inspect and check each individual part of the governor for wear or damage. We have the special tools, engineering assistance and engine testing equipment, plus the advantages of modernization in design and materials to add longer operating life to the units. Moreover, our reconditioning service is low in cost.

May we submit details regarding our Service Policy?

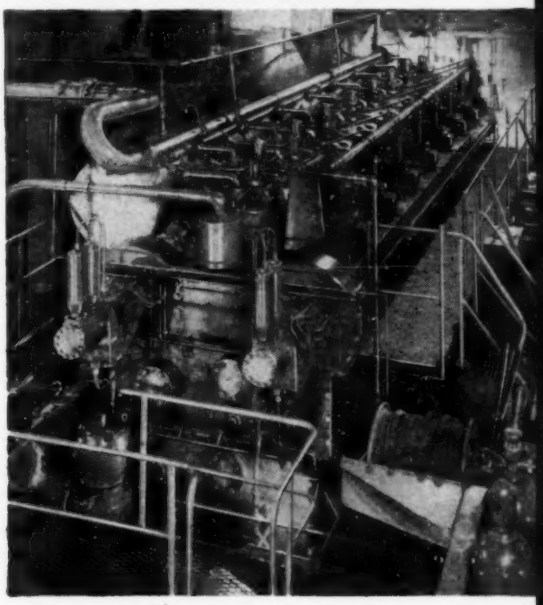
Factory: 1145 Galewood Drive, Cleveland, Ohio
West Coast Governor Station: 4512 San Pablo Avenue, Emeryville, Cal.

The Marquette
METAL PRODUCTS CO.
CLEVELAND 10, OHIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:
ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
ROTARY HIGH PRESSURE OIL FIELD PUMPING MACHINERY

Here's how you can cut diesel engine fuel costs 35.3%

This big (21½ x 27½), slow speed (240 to 257 rpm) Hamilton diesel is saving marine and stationary users 35.3% on fuel costs, because . . .



ANALYSIS (by E. W. Saybolt & Co.) of 1 gallon sample of #6 fuel oil burned in this ore carrier's Hamilton engine:

Specific Gravity @ 60° F.	0.9705
Gravity, API @ 60° F.	14.3
Flash, PM CC.	235° F.
Fire, C.O.C.	375° F.
Visc. SU @ 100° F.	4965 Sec.
Visc. SF @ 122° F.	183 Sec.
Pourpoint, ASTM	50° F.
Saybolt Univ. @ 210° F.	169
Sulfur, ASTM	0.80%
B.S. & W.	0.3%
B.T.U. Per Pound HV	18,516
Hydrogen	11.46%
B.T.U. Per Pound LHV	17,443
Oxygen (By difference)	0.90%
Specific Gravity @ 160° F.	0.9358

It is able to burn unblended heavy residuals. Above is a recent analysis of typical #6 fuel oil used successfully by a Great Lakes ore carrier.

An exhaust as clean as this (above) proves the Hamilton's spherical combustion chamber and exclusive rotary valve promote thorough combustion of such low cost heavy fuels.

"Each year, because of interest in this ship, we have had engineers present at its annual overhaul to check on results secured from use of our products.

"It was felt by all this year that the engine was just about the cleanest engine we have ever observed in many years of marine service. Especially so, considering the use of the varying types of heavy bunker fuel oil.

"The complete absence of varnish or other deposits, in the cylinder liners and pistons; the absence of stuck rings; and the minimum of deposits in the liner ports was remarkable. It would appear that liner wear and piston ring wear have become stabilized at a normal, or possibly even subnormal, rate."

Further proof of the efficiency of this diesel is the above statement by a representative of the oil company supplying the lubricants for this ore carrier.

These facts add up to this . . . for stationary or marine service, HAMILTON DIESELS are by far the soundest investment you can make!

Hamilton Division, Hamilton, Ohio

BALDWIN-LIMA-HAMILTON

FAMOUS LAST WORDS:

Let's face it—they won't send out advance warning notices of atom-bomb attacks. They just sneak over and let go when we're least expecting it—without even so much as a declaration of war. The emergency may be an atom bomb or it may be a fire, a flood, a hurricane. It's only good business to be ready for it—whatever it is. Take these precautions TODAY:

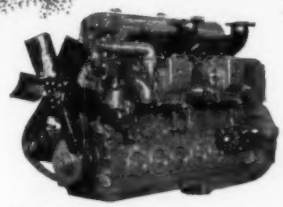
- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

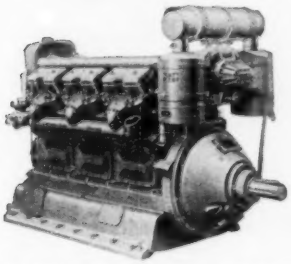
A. Lawrence Bigelow

Publisher

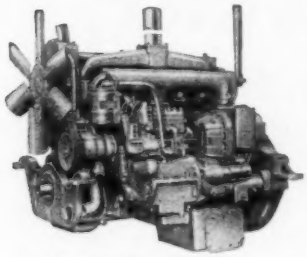
SOME *Famous* ENGINES EQUIPPED WITH SCHWITZER-CUMMINS SUPERCHARGERS



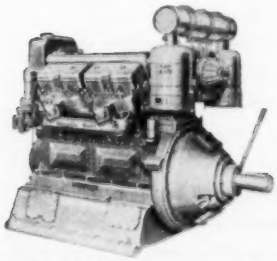
Model 687-C—Harnischfeger Corporation 6 cylinder, 2 cycle using two S-C superchargers.



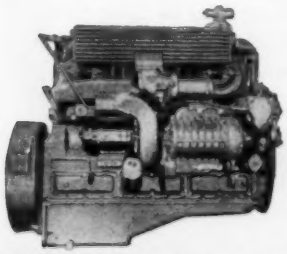
Model D-397—Caterpillar Industrial Diesel V-12.



Model D-337—6 cylinder—Caterpillar Diesel.



Model D-375—Caterpillar Diesel V8.



Model HRBS-600—Cummins Engine Company, Inc. (Used also on HBS Series.)

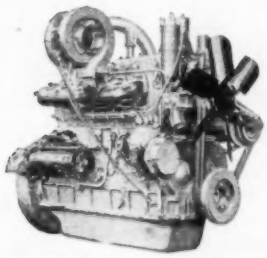
POSITIVE DISPLACEMENT TYPE—EXHAUST DRIVEN TURBOCHARGERS

More than twenty-five years of research, intensive engineering, wide field experience and unexcelled manufacturing facilities are back of our product.

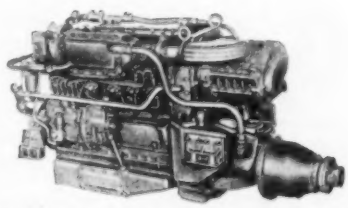
Its excellent service record in tens of thousands of applications under the most severe operating conditions has established Schwitzer-Cummins superchargers as a product of supreme reliability and efficiency.

We build superchargers for trucks, busses, earth-moving equipment, power plants, submarines, in fact for all uses up to 800 hp.

We can offer the last word in engineering assistance and the ability to produce efficiently.

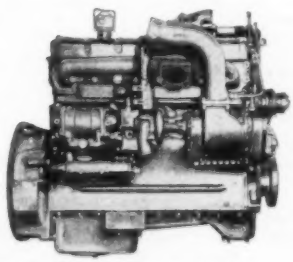


Model 135-DKBS—Waukesha Motor Company with Schwitzer-Cummins Turbocharger.



Model DIX6ES—Hercules Motor Corporation Diesel with Schwitzer-Cummins Supercharger.

SCHWITZER-CUMMINS
Also
Supercharges Engines
for
MACK-INTERNATIONAL
INGERSOLL-RAND
AND OTHERS



Model JBS-600—Cummins Engine Company, Inc. New High Speed Engine

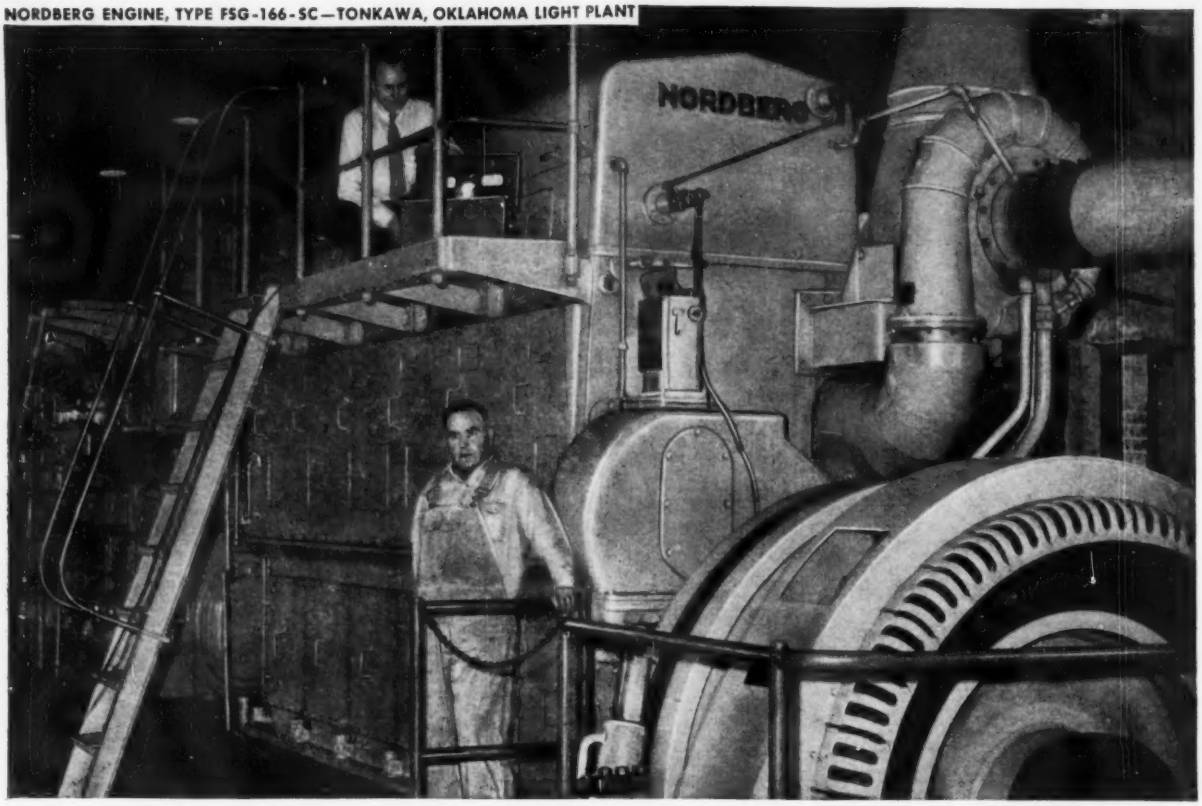
Other Schwitzer-Cummins Products

• OIL PUMPS • WATER PUMPS • COOLING FANS • CRANKSHAFT VIBRATION DAMPERS • AUTOMATIC SHAFT SEALS • AIR STARTING MOTORS • THERMOSTATICALLY CONTROLLED FAN DRIVES

SUPERCHARGER SPECIALISTS FOR OVER 25 YEARS

SCHWITZER-CUMMINS COMPANY
1125 MASSACHUSETTS AVE. · INDIANAPOLIS 7, INDIANA

NORDBERG ENGINE, TYPE FSG-166-SC—TONKAWA, OKLAHOMA LIGHT PLANT



30,000 HOURS, NO WEAR

MICROMETER MEASUREMENTS			
LINER MEASUREMENTS		WITH CRANK	90° TO CRANK
#1 Liner	Top	16.004"	16.008"
	4" down	.003"	.006"
	8" down	.0035"	.007"
#2 Liner	Top	16.003"	16.002"
	4" down	.002"	.001"
	8" down	.001"	.0005"
#3 Liner	Top	16.005"	16.007"
	4" down	.004"	.006"
	8" down	.003"	.008"
#4 Liner	Top	16.003"	16.004"
	4" down	.004"	.005"
	8" down	.001"	.002"
#5 Liner	Top	16.004"	16.000"
	4" down	.003"	.000"
	8" down	.003"	.001"
#6 Liner	Top	16.003"	16.0015"
	4" down	.0015"	.0015"
	8" down	.0015"	.0005"
(Original machine shop tolerance—16" plus or minus .001")			

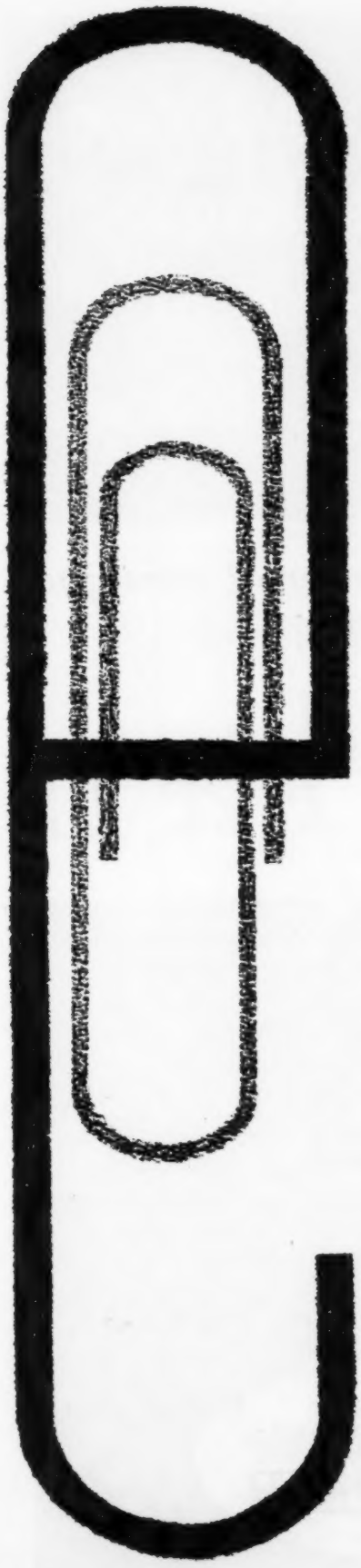
No Wear On Rings Or Liners With Great Cities Service Diesel Oils!

When the Tonkawa City people pulled this Diesel off the line for periodical inspection, it had logged 30,038 hours and was approximately six years old. After they had the engine torn down, micrometer measurements were taken on the cylinder liners. THEY COULD FIND VIRTUALLY NO APPRECIABLE WEAR ON RINGS OR LINERS!

They were so amazed that they had another man in the plant take his own micrometer readings. Still not certain that an engine could run that long with so little wear, they had the micrometer itself checked! The instrument checked out perfectly!

Men who have worked with Diesel Engines all their lives have said that they've never seen an engine with that much time in service with so little wear. Obviously, a great deal of the credit must go to the maker of these splendid engines, but also, credit must be given to the high-quality, wear-reducing Cities Service Diesel Oils used in this engine. You'd be wise to buy yourself this kind of inexpensive diesel-engine protection too. Call your nearest Cities Service Office or write Cities Service Oil Company, Sixty Wall Tower, New York City 5, N. Y.

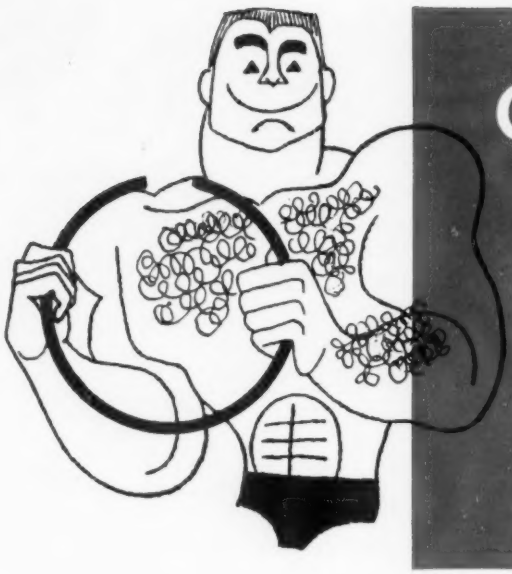
CITIES SERVICE
QUALITY PETROLEUM PRODUCTS



ditorially speaking

Don't Be a Sucker!

Last month we blew our top about a lot of minor irritations. This month we have developed a slow burn about something more important. Have you noticed the apparently increasing trend toward—let's say "loose"—advertising directed at the diesel field. It's not done by the solid core of suppliers that have served the industry so well; their statements have a sound engineering basis. It comes from a "fringe" group similar to that which plagues the automotive industry. If you listen to the automotive claims, you'll never have to touch your car. And power—oh, boy! By using a special dope, you correct for wear, plate the cylinder walls, and get 10 per cent more power. Another material will cut friction and give you 10 per cent more. And save money? A gadget on your carburetor will double your mileage. Put this in the crankcase and you never have to change oil. You see what we mean; each may have some virtue but you never get the full story. It's starting in the diesel field and will probably get worse as the field expands. Take filter elements. One mail offering was for units to replace a long list of well known products. Price is undoubtedly low, but the only specific data given was that they fitted the casings! If this is the only criteria for filters, filter engineers are spinning their wheels. We'd want to know a lot more before we trusted them to protect our engine. One cleanable-type element features micronic filtration and elimination of replacement cost. Pressure drop and surface area are not mentioned. Wash them? It's hard enough to get some people to change them. As we said, it will probably get worse as we expand, but *you* don't have to fall for it. You're involved with a premium-priced machine built for long service. Don't buy price; buy quality. It's cheaper in the long run. Brand names have validity in our field too.



Cyclan has twice the breakage resistance of ordinary iron

No other piston ring material combines so many advantages as

Cyclan

- Cyclan is Sealed Power's new alloy for extreme operating conditions.
- Cyclan's strength approaches that of steel.
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- Cyclan retains the bearing characteristics of cast iron.
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SEALED POWER CORPORATION, MUSKEGON, MICHIGAN

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CYLINDER SLEEVES

highlights

- The Jersey Central Lines recently announced the delivery of the first of seven Trainmaster units on order from F-M.

- August is the month for the National SAE Meeting. It will be held at the Statler Hotel in Los Angeles, Cal., from Aug. 16 to 18, 1954.

- Research men on the B&O are currently experimenting with radio isotopes to detect flaws in metal axles, wheels, couplers, etc.

- "Cat" is reportedly planning to use radioactive materials in its research department to determine wear on engine parts.

- It was recently reported that GM is preparing to try out a gas turbine in a Greyhound bus. Reportedly the project has been underway for about two years.

- It was recently announced by the FPC that the Panhandle Eastern Pipe Line Co. has filed an application to increase system capacity by 455 mcf of natural gas per day. The proposed expansion will include the installation of 113,000 hp in additional compressor capacity.

- Roadway Express, Inc. is receiving delivery of 124 Model H-61T Mack tractors powered by Mack Thermodyne diesels.

- The Third National Teenage Roadeo will be held in Washington, D. C., from August 10 to 14, 1954.

- Heard at an AREA Convention. . . . An efficient cleaner for small parts was made by using an agitator-type washing machine and putting the cleaning solution in the tub with the parts . . . even the ringer was used for applying gasket compound to both sides of gaskets simultaneously.

- According to API, it takes approximately 3000 bbl of fuel oil to drill a typical 10,000-ft oil well.

- American-Louisiana Pipe Line Co. has proposed a Louisiana-to-Michigan pipeline of about 1625 mi in length with 66,900 hp of compressor capacity.

- Leyland Motors Ltd. of Canada has started production of Canadian-designed diesel-powered trucks, it was recently announced.

- The Canadian National Railroad, now in the midst of a large equipment-buying program, plans to spend more than $209 million during 1954.

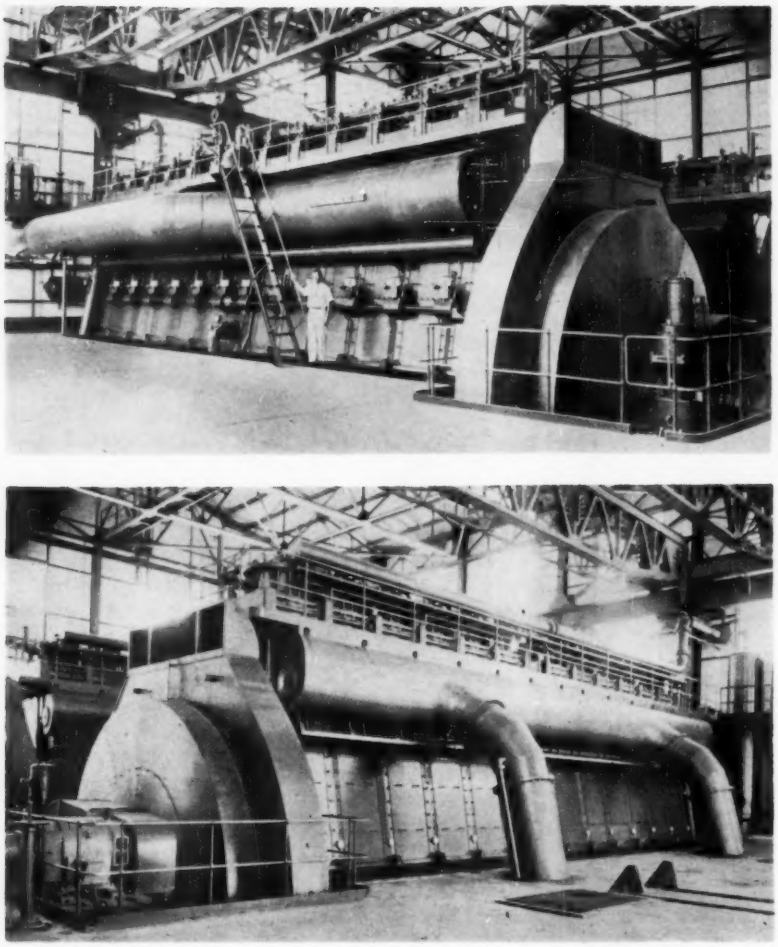
- In 1953, U.S. railroads operated more than 22,500 diesel-electric locomotive units. In 1939, there were only about 500 diesel-electric locomotive units in service.

- During 1953, Class I railroads increased their total freight car fleet by 19,317 cars over the 1952 total, according to AAR.

- About 1000 engineers from industry and consulting firms converged on Milwaukee, Wis., for the 20th Annual Meeting of the National Society of Professional Engineers which was held from June 9 to 12 at the Schroeder Hotel.

- An expected arrival in the field of earthmoving equipment was the Caterpillar Model D-9X tractor which was recently introduced and is currently undergoing tests in the field.

- During the first four months of 1954, Class I railroads placed 556 new diesel-electric locomotives in service. As of May 1, Class I railroads had 300 new locomotive units on order. These included 277 diesel-electric units, 10 steam units, and 13 gas turbine-electric units.



Coya Sur, Chile

Intake side (top) and exhaust side (bottom) of the Coya Sur engines.

COYA SUR, Chile is the site of a new diesel-powered generating station. On a map of Chile, it will be found between the towns of Maria Elena and Pedro de Valdivia in the vast nitrate fields. This installation does not stand alone however as Coya Sur is the third station in a 3-plant network operated by the Anglo-Lautaro Nitrate Corporation.

Decision to erect a third plant stemmed from a load condition which would not permit expansion of nitrate production facilities. Back in 1951, the two generating stations at Maria Elena and Pedro de Valdivia were operating with little or no reserve. This meant that further electrification of the company's 100-mi railroad and ore haulage facilities was impossible unless more power became available.

After considerable discussion, it was decided that a new installation at Coya Sur would be the answer, since extension of existing facilities was not feasible for one reason or another. At the Maria Elena station there was no room for additional engines, while at Pedro de Valdivia space was available but all new auxiliary equipment would be required and in addition, no use could be made of additional waste heat.

A large item in favor of the Coya Sur installation was the fact that this area is now, and will probably continue to be for some time, the center of the load for the entire electrical system. Therefore, construction of a plant at this location results in economies which accrue from efficient electrical distribution and lower line losses.

Further, it is also a possibility that additional solar

evaporation facilities and by-products plants will be constructed in the same area making it not only convenient to have a source of power nearby, but also waste heat which is used in the form of hot water or steam to step up the evaporation process.

Plant Design

Following the preliminary go-arounds, in which the amount of power required and other pertinent factors were decided upon, Anglo-Lautaro engineers selected the Nordberg Model TS2912 diesel. Plant layout and design were developed through the combined efforts of Anglo-Lautaro and Nordberg engineering departments.

Steel structures to house the engines and auxiliaries were designed in the engineering offices of Anglo-Lautaro and the detailed drawings then sent to the Bethlehem Steel Corporation where the structural steel was fabricated.

The nearest rock outcrop to the solar evaporation plant was selected as the point at which to break ground for the foundations. This happened to be the site of an old nitrate plant which conveniently had the advantage of already-constructed terraces. These were later used to place cooling water and other storage tanks at the proper elevation without costly masonry work.

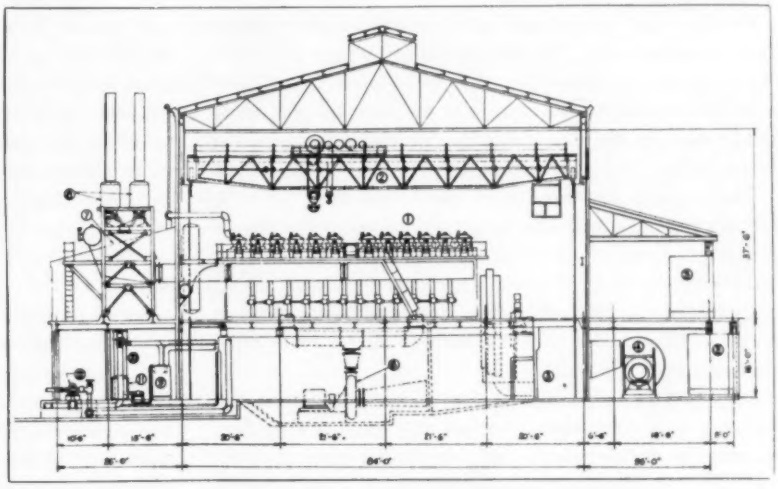
While in the design stages, engineers were careful to allow adequate space in the engine room to permit the safe handling of large components around the engines and also to encourage cleanliness. Finished plans called for an 84-ft by 108-ft main engine room.

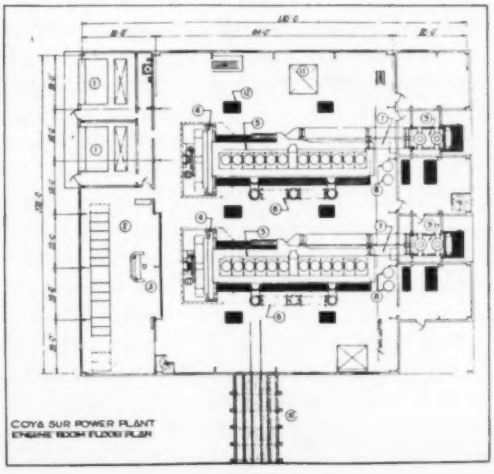
Also provided, for the convenience in handling large parts and other equipment, is a railroad siding which extends into the engine room. This has been accomplished by the installation of an approach trestle. When not in use, a large rolling door seals out the heat and dust from the engine room.

Auxiliary equipment is distributed mainly between rooms adjoining the main engine room on the east and west walls and the plant basement. A gallery along the east wall of the engine room provides a walkway between the engines and fuel heating and filtration equipment. Starting air bottles are also placed along the east wall. Placed in a vertical position, two for each engine, the

Sectional View through Power Plant

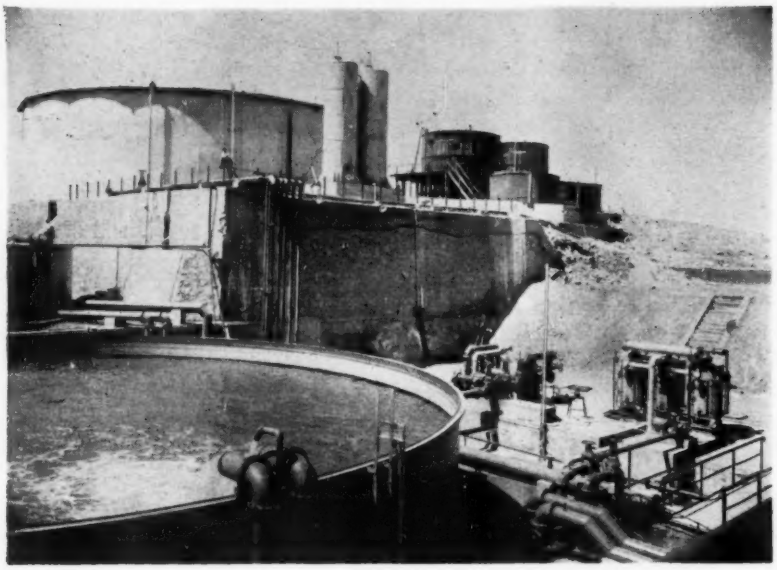
1—Engine
2—50-ton crane
3—Plenum chamber
4—Air washer fan
5—Air washer
6—Scavenging air blower
7—Waste heat boiler
8—Silencer
9—Lube oil sump tank
10—Lube oil cooler
11—Lube oil filter
12—Jacket water pump





Engine Room Floor Plan

1—Air washers
2—Control room
3—Control desk
4—Generators
5—TS-2912 engines
6—Scavenging air piping
7—Exhaust pipes
8—Starting air bottles
9—Waste heat boilers
10—Approach trestle
11—Service hatch
12—Ventilating grills



Hot jacket water sump is in foreground, cold sump on upper left; river water storage; two fuel oil service tanks, upper center; distilling plant and heat exchangers are at the right.

bottles rest on concrete pads and extend upwards through the walkways or gallery floor.

On the west wall of the building are the air washers and air washer fans. The centrifugal-spray type air washers, mounted one above the other on different floors, have a louvered intake to the outside of the building and spray eliminators in the fan side. Two washers are required for each fan.

The washers and fans have been duplicated to facilitate maintenance and also to provide a spare in case of a failure. Each of the four washers has a capacity of 75,000 cfm at 70°F. The two heavy-duty fans, each with a capacity of 152,500 cfm, are equipped with shutters on the discharge side so that either fan may operate while the other is not in use.

In addition to providing air for ventilation of the building and generators through the plenum chamber, scavenging air blowers are also supplied, as are the control room and auxiliary equipment room. Engine room ventilation is effected by the use of grilled openings in the floor. Air is discharged from the building through louvered vents in the monitor which runs the length of the roof, thus providing air circulation which removes vapors from the engine room.

Control Room

This is the pride of the plant. It is also located on the west side of the engine room and is completely closed in and air conditioned. Here, the operator sits in comfort at the control desk, separated from the engine room by a full-width glass wall.

On the control desk are warning lights and auxiliary equipment control switches. In addition to the standard control room equipment found in a modern diesel generating station there are special control panels for each engine containing remote engine controls for starting, loading and stopping; all engine gauges; blower motor control; and push button stations for all auxiliaries.

A special 28-point resistance thermometer indicates lube oil and jacket water temperatures to and from the engine while individual cylinder exhaust temperatures are indicated on the panel by a multi-point, remote-reading pyrometer equipped with a selector switch. Audible and visible alarms are arranged to give warning for excessive temperature and/or low jacket water or lube oil pressure.

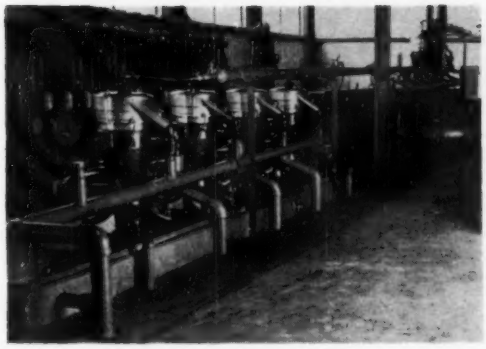
Engines

Engine foundations are of a height which permits the top of the bedplates to be flush with the engine room floor. Due to frequent seismical movements which might cause misalignment of the bedplate sections, it was necessary to use somewhat special construction in fastening the engine floor to the foundation.

Instead of grouting and bolting bedplates directly to the foundation in the usual manner, bedplates were placed on shims resting on machined surfaces of special box-type cast-iron girders. These run the full length of the engines and are grouted into the foundation. In fabricating the girders, eight chocks are also provided which act to wedge in the bedplate against any possible lateral movement.

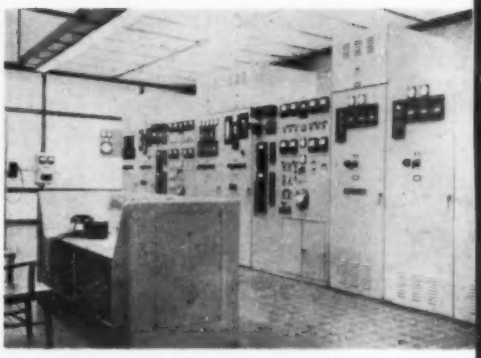
The two units installed here are similar to those engines installed by Nordberg for the Mexican Power and Light Co. at Tacubaya, Mexico, with the exception that these engines embody some recent design changes and resultant higher ratings. Each of the two engines at Coya Sur are 2-cycle in-line units having 12 cylinders of 29-in bore and 40-in stroke.

Operating at 171 rpm, the engines are rated 9600 bhp at sea level, which corresponds to 8950 bhp at Coya Sur's 4166-ft elevation. Net electrical rating is 6400 kw at 80



Six centrifuges clean the fuel oil. Two at back are used as separators, four as clarifiers. Note gravity flow.

Lubricating oil sump tank, recirculating pumps and purifiers.



Air conditioned control room with operator's desk and the auxiliary equipment controls.

per cent pf. The horsepower rating is also net. Power input to the motor-driven scavenging air blower is 545 kw when the engine is operating at full load.

Generators are of the flywheel type, totally enclosed for forced air ventilation and are rated at 8750 kva, 7000 kw at 80 per cent pf. The totally enclosed feature of the generator is designed to eliminate oily deposits on the windings and also provide more efficient cooling of the generator.

Fuel System

An all-welded steel tank with a capacity of 5000 tons has been provided for the storage of fuel oil which is delivered from a nearby seaport in tank car lots. Since fuel is transported in tank cars which also handle Bunker C oil, it was found advisable to centrifuge and filter the fuel before transferring it to the injection equipment.

Fuel is drawn from the storage tank through a steam heater as required, and passed through an edge-type filter. From this point, fuel is pumped through another thermostatically controlled steam heater which maintains the temperature desired for centrifuging.

For centrifuging, there are six centrifuges placed in two groups. The first group (two units), used as separators, is installed on a platform above the level of the second group (four units), used as clarifiers. The 2-level arrangement makes it possible to feed the clarifiers by gravity from the discharge of the separators. Fuel also flows by gravity to the sump tank from where pumps automatically actuated by level controls deliver cleaned fuel to service tanks located on a terrace outside the plant.

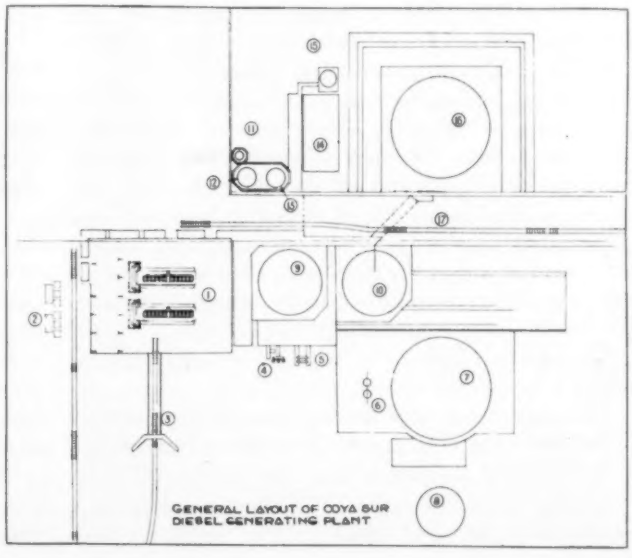
Physical characteristics of the two grades of fuel used here are as follows:

	Talara	Stanship
Specific gravity at 60°F	.890	.916
Beaume 60°F, A.P.I.	27.5	23
Viscosity SSU at 122°F	76	60
Flash Point	180°F	150°F
Fire Point	240°F	—
Carbon Residue (Conradson)	2.01%	.1%
Ash	.03%	.02%
Sulphur	.23%	1.25%
Asphalt soft	.42%	—
Asphalt hard	.16%	—

A static head, amounting to about 20 psi, is provided by the elevated service tanks. However, to insure ade-

General Layout of the Power Plant

1—Main building
2—Outdoor substation
3—Approach trestle
4—Distilling plant
5—Heat exchangers
6—Fuel oil service tanks
7—River water tanks
8—Fresh water tank
9—Jacket water hot sump
10—Jacket water cold sump
11—Distilled water tank
12—Air washer sump tank
13—Jacket water sump tank
14—Oil cleaning plant
15—Clean oil tank
16—Fuel oil storage tank
17—Fuel oil unloading ramp



quate circulation when the heavier fuels are used, the pressure is boosted to 30 psi by pumps installed in the line between the tanks and filters.

Also, when the heavier of the two fuels is used, electric heaters are employed to raise fuel temperature from 10°C to 50°C before it goes to the engine. Filters, heaters, and fuel oil booster pumps are all located on the gallery in the engine room. Copper tubing with high melting point soldered joints connect these units.

Lube Oil System

Mechanical force-feed lubricators supply lube oil to the engine cylinders while a pressure lubricating system is employed for the other parts of the engine. Since the plant is designed to operate with only a switchboard operator and an assistant, provision has been made for maintaining a constant level in lubricator reservoirs. With this arrangement, the assistant switchboard operator is only required to make one trip per shift around the lubricators to see that they are functioning properly. Normally, this is done while the attendant is making a routine inspection of the engines and auxiliaries.

The constant level in the lubricator reservoirs is maintained by the use of a lube oil storage tank located in the plant basement, equipped with a remote level indicator which is located on the control desk. Oil is pumped from this tank to a small tank mounted on the wall behind each engine. Oil level in the wall-mounted tank corresponds to the level in the lubricator reservoirs. Make-up oil from the storage tank travels through a closed circuit to the lubricators, eliminating the possibility of foreign matter entering the lube oil when reservoirs are filled. Increased protection is also afforded by this arrangement as the human element has been done away with.

Lubricators are connected to the wall-mounted tank by a header running beneath the floor with risers to each lubricator. A short section of Neoprene rubber hose in each riser provides for testing oil consumption and distribution. Rubber hose was selected instead of valves because of the possibility of leaving a valve closed. The hose system employs one pinch clamp which must be returned to the switchboard when testing is finished.

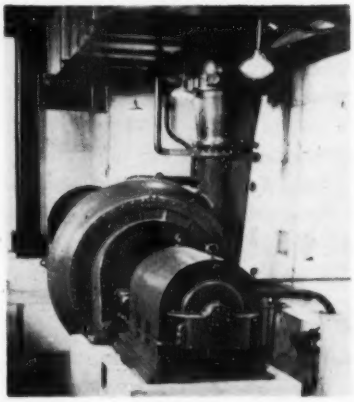
Crankcase lubrication is accomplished by three vertical pumps with built-in check valves mounted in a 300-gal closed sump tank. The tank is divided into high- and low-pressure compartments with an internal strainer. This arrangement is designed to eliminate the large and complicating piping, leaky glands, check valves, and external strainer. Any two of the three pumps can supply the required quantity. The third acts as a spare. Pressure selector switches permit operation of any two pumps; and if either fails to maintain the required pressure, the idle unit is automatically started.

Discharge piping from the high pressure compartment of the sump tank runs directly to the lube oil coolers and then returns to the engine inlet. Also provided is a recirculating system to pass lube oil from the sump tank to lube oil purifiers and back.

Waste Heat Recovery

Next in importance to the power generated by this installation is the use of the waste heat from the engines. As has been previously mentioned, one of the primary reasons for building the power plant near to the Solar Evaporation Plant in Coya Sur was to take full advantage of the waste heat.

Heat rejected to the jacket water and in the exhaust gases are the sources of heat used to concentrate solutions and to distill river water for engine jacket water make-up. Heat reclaimed from the jacket water is more important from the standpoint of recovery as it is over twice the amount reclaimed from the exhaust gases.



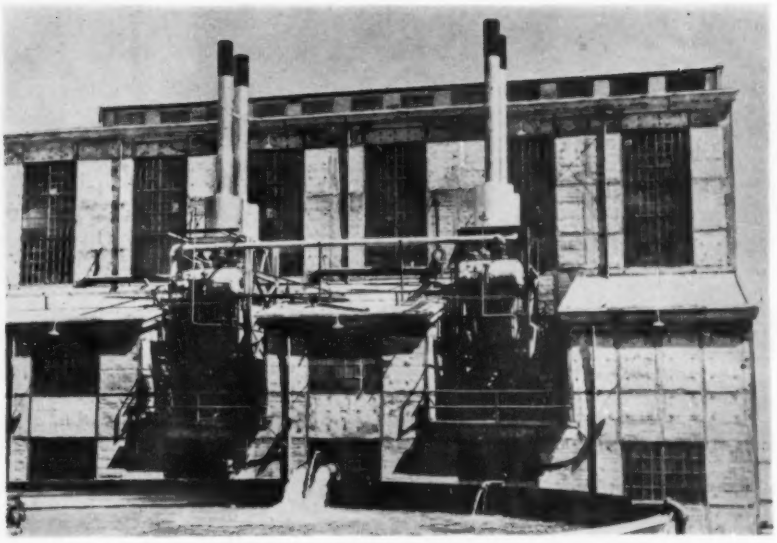
Scavenging air blower and motor, unitized on common base, discharges upward to engine's air header.

Waste heat boilers operating at 25 psig steam pressure evaporate about 6500 lb per hour of river water each. Under normal operating conditions, engine exhaust gas enters the waste heat boiler at 450°F and leaves the boiler at about 350°F. The steam generated is used principally as distilled make-up water for the engines and air washer system. In addition to the distilling plant, steam heat exchangers have been installed for further heating of solutions in the by-products plant.

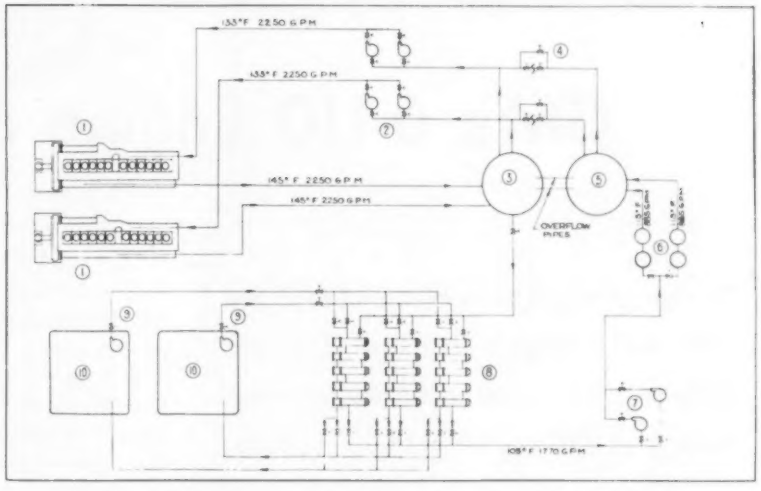
Cooling System

The engine cooling water system differs from a closed system only by the addition of the 100-ton capacity hot and cold sump tanks which are open to the atmosphere. Purpose of the tanks is to provide a larger body of cooling water than available with the entirely closed system and a more even water temperature which is easier to control. Instead of cooling towers, this system has heat exchangers in which evaporation solutions are heated by the jacket water heat exchangers, thereby cooling the jacket water. Water leaves the engine at about 145°F and discharges into the hot sump from which it flows by gravity to the jacket water heat exchangers, a distance of about 2000 ft.

The coolers are connected in series on both solution and jacket water sides. First, jacket water from each engine passes through five coolers, reducing the temperature from



Above the jacket water hot sump in foreground are the waste heat boilers; hot jacket water sump distilling plant; and exhaust silencers.



Schematic Diagram of Cooling System

1—Engines
2—Circulating jacket water pumps
3—Hot jacket water sump tank
4—Temperature regulating valve
5—Cold jacket water sump tank
6—Lube oil coolers
7—Cold jacket water return pump
8—Jacket water coolers
9—Vertical solution pumps
10—Solution evaporating ponds

145°F to 105°F, then is pumped back to the lube oil coolers where the water temperature is raised to 115°F before being discharged into the cold sump.

Since the water inlet temperature to the engines should be about 133°F, mixing valves are installed in the lines from the hot and cold sumps to maintain the proper inlet temperature to the engine.

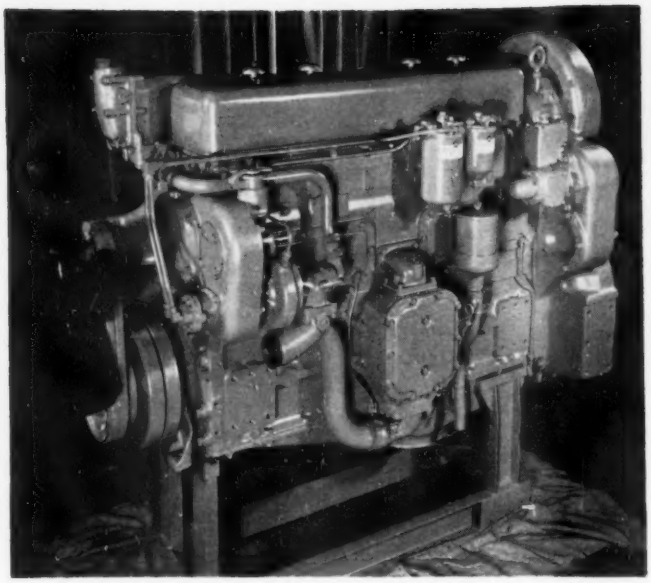
Summing Up

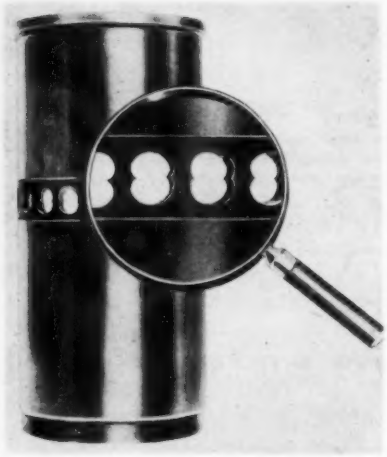
Permanent repair crews are not employed for this plant as complete machine shop facilities are available at the Maria Elena plant. The Coya Sur power plant is provided only with store rooms for spare parts and adequate transportation facilities for repair crews.

Big engines coupled with remote controls, high recovery of waste heat, and many new labor saving operating ideas make this installation truly unique. Coya Sur is already taking a large share of the load and providing reserve capacity to extend railway electrification and making it possible to expand production facilities.

Principal Equipment

Engines	Nordberg Mfg. Co.
Generator	General Electric Co.
Blowers	Elliott Co.
Governor	Woodward Governor Co.
Fuel System	
Injection Equipment	American Bosch Corp.
Centrifuges	DeLaval Separator Co.
Filters	Wm. W. Nugent & Co., Inc.
	Cuno Engineering Corp.
Heaters	Edwin L. Wiegand Co.
Lube Oil System	
Mechanical Lubricators	Manzel
Coolers	Kewanee-Ross Corp.
Purifiers	Honan-Crane, Inc.
Centrifuges	DeLaval Separator Co.
Jacket Water Pumps	Allis-Chalmers Mfg. Co.
Waste Heat Boilers	Combustion Engineering Co.
Distiller	Davis Engineering Co.
Switchgear	General Electric Co.
Control Panels	Nordberg Mfg. Co.
Air Washers	American Blower Co.
Fans	American Blower Co.





At left, an automotive version of the GM 6-110 engine. Above is the liner incorporated in the new "300-horsepower" engine. Air intake area has been increased by 23%.

GM's 6-110 Engine Modified

Design changes have been made in the GM 6-110 engine — allowing power ratings to be upped to 300 hp for maximum and 230 hp for continuous duty.

GENERAL Motors' Detroit Diesel Engine Division recently announced several changes in the design of its Model 6-110. Resulting from the changes are higher speeds and higher outputs. Maximum and continuous ratings are now 300-hp and 230-hp respectively.

Totaling 25- and 17-hp respectively, the increases provide extra power which will be especially useful in heavy-duty hauling vehicles, shovels, cranes, and other installations subject to sudden load increases.

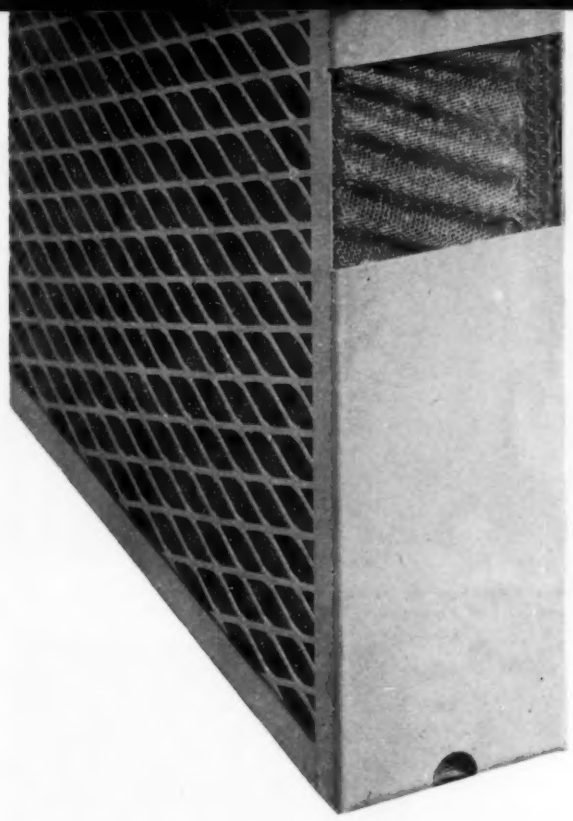
Basically, the power increase in the 2-cycle diesels is the result of freer "engine breathing" and higher engine speeds. Freer breathing has been accomplished in part by increasing the number of ports in the cylinder liners. The ports have also been grouped together in partially overlapping pairs to form larger figure "8" shaped openings.

Both the design and the increased number of ports in the new liner have contributed to a gain of approximately 23 per cent in air intake area, thereby improving fuel combustion and exhaust scavenging. Only the "Figure-8" liner must be used in the "300-horsepower" engines. However, either the new or old type can be used in the older "275-horsepower" engine, in fact, they can be mixed where complete replacement is not required.

With the increased scavenging capacity thus provided and because the inherent strength of all structural parts allowed it, maximum engine speed has been increased from 1800 to 2000 rpm. Continuous operating speed is now 1800 instead of 1600 rpm. According to Division spokesmen, these increased engine speeds were set after thousands of hours of operation proved them to be consistent with long engine life expectancy.

Other changes which contribute to greater operating efficiency and longer engine life include a new "high valve" injector similar to that recently introduced on the Series 71 models, new roller bearing idler gear mountings and larger piston struts to add strength and rigidity to the pistons. An SAE No. 1 flywheel housing size is also being offered which permits the use of additional standard transmissions without the use of an adapter ring.

Conversion of the 275-hp engine may be accomplished by utilizing all of the newly-designed parts for the 300-hp engine. To be on the safe side, however, see to it that the engine manufacturer or his local representative is consulted so that *all* conversion details are properly covered. It might also be a good idea to consult the builder of the equipment to be powered as the additional horsepower may cause damage to the driven equipment due to the increased torque.



Reviewing Some Air Filtration Principles for Locomotives

by H. E. Donovan, Air-Maze Corporation

Some well-established ideas and some new ones on a subject so important that all phases must thoroughly be understood

GOOD air filtration is essential to protect and reduce to a minimum wear of internal moving parts of diesel engines, air compressors, commutators, and brushes of generators and traction motors. It also serves to protect insulation of electrical equipment from airborne dirt as much as possible.

Manufacturers of air filters and diesel locomotive builders have long been aware of, and firmly believed in, the importance of this subject. Railroad maintenance supervisory personnel are becoming more aware of the need for good air filtration as they see damage caused by dirt.

Air filters on diesel locomotives are divided according to use into two groups: (1) car body filters, a viscous impingement oil-wetted panel type two inches thick; and (2) engine air filters, either a 2-in or 4-in thick oil-wetted panel filter (most generally used), an oil-bath filter, a centrifugal-type dry filter, or an electrostatic filter. The latter three, so far, are being experimentally tried on locomotives.

Car Body Filters

Purpose of these car body filters, located in the sides of the car, is to pre-clean all air entering the engine room. From this source, a considerable amount is drawn into the engine air intake and intakes of air compressor and traction motor blowers. This air is also supplied for ventilating and cooling main and auxiliary generators and is the supply for radiator cooling fans. Total volume required for these purposes is very high, variously reported to be from 20,000 cfm to 60,000 cfm for a single engine road unit with enclosed engine room.

Obviously, a high-velocity filter is the only type to use in the car body, and if properly maintained, will intercept and retain much of its accumulated dirt load. If filter maintenance is poor and filters are not changed at regular intervals, the type can, and does, "unload" part of its dirt to the engine room. But it will not shut off the vital air supply.

Use of car body filters on switcher-type diesel locomotives is advisable. Their use will reduce, to a large extent, the amount of dirt carried into the engine-generator compartment. This will keep it out of electrical equipment and pre-clean the air going to intakes of engine, air compressor, and traction motor blowers. In many instances, these units operate in heavily contaminated atmospheres. Beneficial results will readily justify their application.

Engine Air Filters

Purpose of these filters is to clean only that portion of the air used by the engine for combustion and scavenging. Airborne dirt can be identified generally as combustible and abrasive, the latter type being of the most concern. Once abrasive dirt has passed engine room filters, it is on its way to the engine interior where, sooner or later, it causes trouble. Therefore, filters used for this purpose should be of highest possible efficiency consistent with sufficient capacity.

An engine air filter should possess characteristics that will be efficient at all engine speeds, have a minimum resistance to air flow, operate efficiently as long as possible between servicing, and be easily cleaned.

Amount of air required by a locomotive engine at idle is about 30 per cent of that at full load. Therefore,

a 16-cyl engine at idle requires about 1800 cfm, while at full speed and full load the same engine takes about 5400 cfm. This is the reason why an engine air filter should be efficient at all speeds.

Engine Air Filter Types

Panel-type filters, most generally used on locomotives so far, are oil-wetted, 2-in or 4-in thick, with two basic designs of media. One is known as "chevron" or "herringbone" construction, technically a high-velocity type designed for ideal operation in a somewhat limited velocity range. The other is a "cross-crimp" progressive density type having a slightly higher initial pressure drop but able to shift with air velocity changes so that a relatively even and high efficiency results.

Ability of a panel filter to do a good job depends on several factors, principal of which are effective media design and use of a good filter oil coating which will adhere to the media. The coating must have the ability to "wet" the dirt and retain it to prevent "unloading." Filter change-out schedules geared to operating conditions are also important.

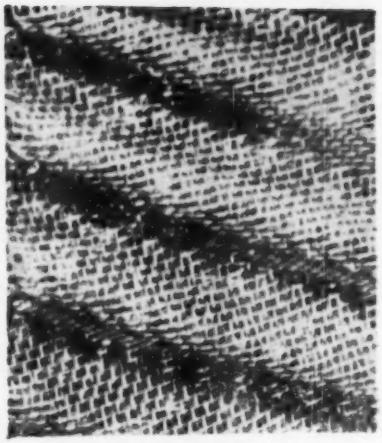
Oil-bath filters while new in the locomotive diesel field have been proved by years of satisfactory performance in the stationary engine and compressor fields. They have become available recently for the engine air intake of many locomotive types. Design is progressing to eventually include the majority of types operating on the nation's railroads.

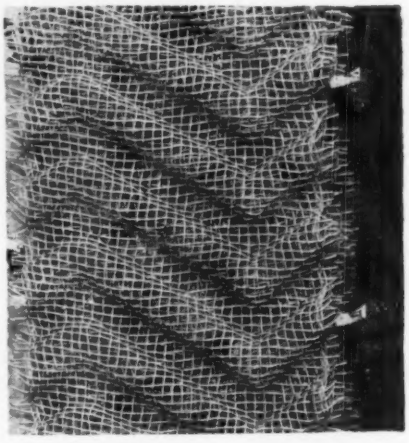
In an oil-bath filter, the velocity of air as it passes into the filter is used to engage oil and to carry it on to a cylindrical screen element. The filter media is so designed that as oil is carried up the screen, it reaches a point where gravity returns the oil and dirt to the sump. At the same time, an inner media causes a separation of air and oil so that oil-free clean air enters the engine. The oil used in the filter is the same kind as used in the engine lube oil system.

One reason for the high efficiency of this filter is that an efficient screen media is continuously receiving an adequate supply of oil to wet the dirt, and the dirt intercepted on the media is removed by the oil-washing action and deposited in the sump. Air velocity changes do not affect the high efficiency of the oil bath filter to any marked degree, and the oil washing action is effective from 10 per cent of capacity to full capacity.

A dry-type centrifugal filter consisting of a panel assembly having a number of cyclonic-type separator units arranged in parallel is being used on locomotive engine intakes. In this type, unfiltered air enters each intake tube through deflecting vanes that produce a high-velocity vortex. Dust particles are centrifuged outward and carried out by bleed off air (about 10 per cent required). The main flow of air, still whirling, reverses direction and travels toward the inlet around the outside of the discharge tube in a second cyclonic action. Cleaned air flows through the discharge tube into the engine air intake manifold.

Efficiency of this type is proportional to air velocity; the higher the air flow, the more effective will be the centrifuging of the dirt particles. As air velocities increase, so also does pressure drop. Filter pressure losses in this type of filter are generally consistent with pressure losses found in the oil bath filter.





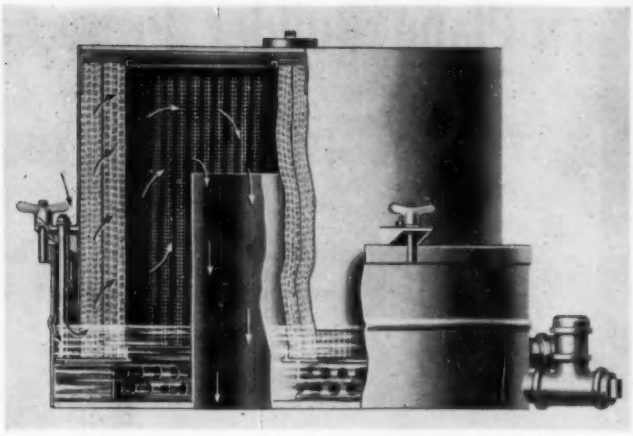
Panel filters may be "cross-crimped" (above) or of "chevron" or "herringbone" type as shown below.

An electrostatic filter is also being currently considered for cleaning engine air. This is an electronic device which charges dirt particles electrically so that they will be attracted to plates having an opposite polarity charge. Industrially, this type has been very effective in removing particles of one micron or smaller in size.

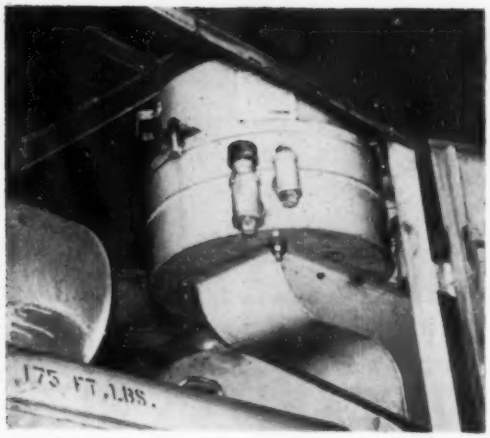
Additional Facts—Various Types

Filter pressure drop exists in all filters. Of course, a low pressure drop is desirable, consistent with high efficiency and sufficient capacity, with the filter operating under a dirt load. As the dirt load increases on a panel filter, the pressure drop rises. Some filters are so designed that when the drop exceeds a certain value, the collected dirt will unload. This means that a predetermined maximum pressure drop will not be exceeded.

Another filter type has a characteristic which permits it to accumulate a dirt load. As this load increases, the pressure drop increases. If it were allowed to oper-



Air flow through an oil-bath filter in section is indicated.



Oil-bath filter installed with good accessability

ate long enough, it could reduce the amount of air passing through to below that required by the engine. Filter changeouts at proper intervals permit the latter type to operate effectively with no penalty to operation resulting.

The oil bath filter has a higher initial pressure drop than most panel filters. But the pressure drop at any specific flow rate is a constant whether the filter has just been placed in operation or has been in use for the usual service period.

A 90-day servicing period is customary, at which point a dirt deposit between $\frac{1}{4}$-in and $\frac{1}{2}$-in deep may be expected in the bowl bottom. This period of servicing might be varied either way, depending on the type of service and airborne dirt concentration in the operational environment. The screen element, due to the oil-washing action, is clean at the end of an operating period and no element servicing is required.

During the service period little or no oil is added since, under normal conditions, only the light ends of the oil are lost. This is due to the scrubbing action of oil in the filter, the loss representing a very small percentage of the total oil in the filter bowl. If oil in any quantity is lost to the engine, this indicates that the filter is operating above its designed air-handling capacity.

There is no possibility of oil sloshing out of an oil-bath filter when the locomotive is running, due to the operating principle of the device. Filter oil is separated into two supplies, a working supply and a residual supply. With the engine running, oil in the working chamber is at work on the filter screen, while the secondary supply is adequately confined so that oil splash is eliminated.

Servicing panel-type filters consists of washing them with hot water to remove loose dirt, thorough cleansing in an alkaline detergent solution bath, rinsing with hot water to wash off chemicals, and then drying with blasts of dry compressed air. This is followed by oiling with a suitable filter oil either by spray or by immersion, and preferably the latter. After this, the panel should be allowed to drain or is spun to remove excess oil.

Machine servicing throughout is preferable to handling by hand, wherever justified by volume. Machine handling results in more consistently thorough servicing. A filter cannot be expected to perform effectively if a haphazard job of cleaning, drying, and oiling with a minimum amount of ineffective oil is done. Proper handling of filters and avoidance of practices likely to cause damage necessitating eventual replacement is important to long life.

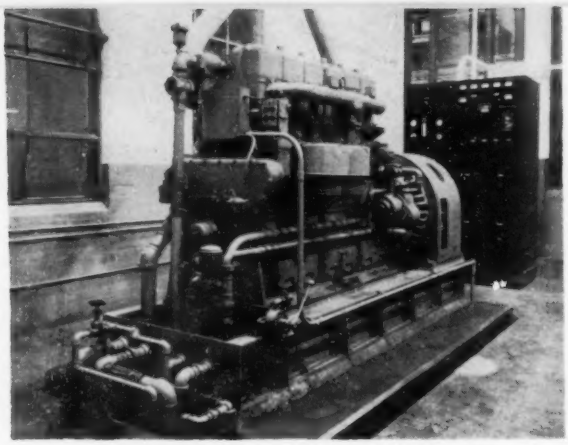
If filters are to be changed out as required, spare units ready for installation must be available. Serviced elements should be stored on edge and protected. Stock should be rotated so that freshly oiled panels are available with none left on the shelf to dry out.

While most railroads now have established filter changeout programs based on local operating conditions, it is advisable that a supervisor make a spot check occasionally to verify that filters are not being overrun. Usually, an inspection of the filter and adapter behind it will disclose if filter has been in service too long. It will also show whether it was properly applied to give a tight seal, thus preventing bypassing of dirty air around the panel. Air box inspections of EMD and F-M engines help to round out such inspection. If much dirt is in evidence there, further examination is in order to determine cause.

Summary

The need for adequate air filtering on diesel locomotives has been firmly established. Much thought and study is currently in process to determine what type and size of dirt particles contribute most to engine wear. As yet, there is no determination as to particle size (microns) above which normal engine wear (if such is known) is unduly accentuated.

There are different lines of thinking as to what constitutes an adequate air filter. This is a very healthy situation for the railroads, locomotive builders, and also for filter manufacturers. Improved filters will be the result.



Plane Builder Protects Against Power Loss

North American Aviation sets a pattern that should be followed in every industrial plant

IN 1950, North American Aviation, Inc., was faced with a power problem. At that time, the firm had taken over an aircraft plant at Columbus, Ohio for the production of jet aircraft parts. The problem resulted from a growth in production, far beyond original plant capacity. Economical operations and safety of the plant made expansion of the power distribution system and the inclusion of standby power necessary.

The increased manhours of work on jet airframes up to the present 17,000 employees working "round the clock", and the expansion of the plant necessitated first a careful redistribution of electric power. When this was completed recently, the normal power consumption exceeded the peak loads of the plant during the war years when it was used in the production of piston-engine type aircraft.

Conversion to a fully adequate system of power distribution and standby power were accomplished over the past two years under the guidance of V. R. Little, superintendent of maintenance, and Frank A. Mason, plant electrical engineer.

The magnitude of standby power needs is indicated by the plant's power demand of 11,500 kw which is brought into the plant at 40,000 volts with multiple tie-ins to power supplies of nearby cities. Since this did not prevent power failures, standby power was necessary to maintain a safe level of illumination, keep plant communications working, supply the fire alarm system and stationary fire equipment with power, and provide other types of protection not common in industrial plants. One of these is outside floodlighting. Another is drainage of heavy rain fall or water that would collect on the floors during fire fighting, using motor-driven sump pumps.

Solution of the standby power problem was based on a careful study of essential functions. For example, calculations indicated that power for one light in 25 would be required for emergency illumination.

It was concluded that a 200-kw generator would adequately protect the plant. For power to drive the generator, a heavy-duty Superior spark-ignition gas engine, rated 295 bhp at 900 rpm, was specified. Top rating of 325 hp can be obtained at 1000 rpm. The engine, a Model 6G-510 widely used in oil well drilling service, was supplied by The National Supply Company's Engine Division in Springfield, Ohio, and the generator by the Elliott Company.

Several features of automatic operation make the provisions of emergency power practically foolproof regardless of storms or other causes of power utility line or plant breakdowns. Automatic starting of standby power units by air, gas engine, and battery power are available. Switchgear includes an electrically operated breaker to connect the emergency power source to the common load bus and a similar breaker for connecting "normal power" to this bus. An auxiliary panel is equipped with engine alarm and shutdown control as well as automatic emergency power control.

An "emergency control" switch provides for either automatic load pickup or manual starting. Under automatic control, the engine is started by an air motor if the voltage of the normal power supply drops below a predetermined value. This will be preceded by a bell alarm and a pilot light indication, "normal power off". When the standby generator voltage reaches proper value, the normal power breaker opens and the emergency power breaker closes.

These automatic operations will take place in the reverse order when the normal power source returns to its proper value. To provide for regular testing of the equipment, a "test control" switch is operated to simulate a failure of normal power. The automatic operations follow in the same order and in the reverse order when the switch is turned off.

Further protection of the engine against defective oil pressure, excessive water temperature and speed, is provided by means of an alarm and shutdown control on the auxiliary panel. As the engine starts automatically and lubricating oil pressure increases, automatic energization of these controls is indicated by a pilot light. Automatic stopping is accompanied by automatic reversal of this sequence. Storage batteries energize the alarm panel when the standby engine stops and there is no other power available. All pilot lights and alarms can be tested at any time, either while the engine is idle or running.

MORCO RECONDITIONS A CRANKSHAFT

Crankshaft sectioned through flywheel flange and one crank. Note thin section, weakened by oil hole, between fillets of crank and main journal. Dark areas at bearings are hardened areas. Lines show grain flow.

Factory methods and equipment turn out like-new crankshafts, reconditioned to standard undersizes.

"YOU can't get any decent life out of a reground crankshaft."

"I disagree, Charlie. I've never had any trouble," said Joe.

"I'm with Charlie," said Jack. "We have run into breakage."

"Well, I'm sort of in the middle," said Jim. "Ours seem to work all right, but the engines never run as well after a shaft regrind. They wear faster too, sometimes only on one or two pins or journals."

Our little skit would indicate that there is quite a difference of opinion concerning the virtues of reconditioned crankshafts. The comments are a composite of viewpoints heard in the field. Why the difference in opinion?

There are a lot of reasons why honest differences of opinion may form. They might stem from variations in the engines involved, the operating conditions, or the service standards. Then again, it might be a difference in the quality of the regrind. All but the last item will affect a new shaft, but reports would seem to indicate that in many cases a new crop of troubles appear when reground shafts are used.

You can't condemn regrinding because many such shafts do yeoman service. They are an economic godsend to many operators. Perhaps the answer lies in the phrase above, ". . . . the quality of the regrind." All right, then what makes for a good job? Where do you look and what do you look for?

Another good question at this point might be, "Can you expect a reconditioned crankshaft to give new-shaft service?" If the forging is sound, dimensional accuracy maintained, and the original practices followed, the answer is "yes." The other half of the qualification is that the engine conditions that affect shaft life must be substantially the same as in a new engine.

All these "ifs" will undoubtedly account for the variety of experiences encountered with reconditioned crankshafts. Actually, there are two areas of responsibility: the crankshaft reconditioner must provide a "good" shaft; and the user must assume the burden for providing the proper conditions for it to live.

Enter Morco, Inc.

We went to Morco's plant in Bedford, Ohio, to see what they thought was important in producing a good reconditioned crankshaft. They are in a unique position to supply the answers and here's why. They are a wholly-owned subsidiary of the Ohio Crankshaft Company of Cleveland, the largest company of its kind in the world. This company also developed the TOCCO induction hardening process used to harden all but about one per

cent of the original crankshafts in heavy-duty diesel truck, bus, and industrial engines built in this country.

This is the pool of know-how and facilities upon which Morco can draw. The parent company supplies many engine builders, including GM and Cummins, with crankshafts for original equipment. Morco was set up to regrind and otherwise recondition these crankshafts. Morco sells a service, not crankshafts. Shafts are obtained on an exchange basis. Used forgings are processed with original factory equipment and methods to specifications worked out with the engine builders. Basically, distribution is through the engine manufacturer's dealers.

Here's how it works. Morco furnishes dealers with a supply of reconditioned crankshafts for different engine models adequate to supply their needs and allow for the normal repair and return cycle. These will be reground to standard undersizes corresponding to the particular engine manufacturer's standard undersize bearings. When the dealer uses a shaft, he must forward to the plant a usable forging of like type and one that will clean up to the same undersize as the one sold.

Currently, Cummins and Detroit Diesel's Series 71 shafts are being reworked on a production basis. Future planning envisions extension of this service to crankshafts of other engine makes and models. Morco does all the reconditioning work at the Ohio location and handles distribution either from there or from its first warehouses in Fort Worth, Texas, or Los Angeles, California, depending upon the point of exchange.

By keeping "banks" in the hands of the dealers, the user can get a shaft with a minimum of delay and costly down-time. But he must have a sound forging for exchange or it's no-go. This points out the first requirement for getting a good reconditioned shaft and is a good take-off to follow a shaft through the reconditioning process to get some answers to our earlier questions.

Inspection

If you do anything to a crankshaft damaged beyond repair standards, you are wasting time and money. This is particularly true in this exchange operation, plus the fact that you have lost a forging that must be made up in some way. Point-of-exchange inspection by dealers is therefore highly desirable. They must answer two basic questions: "Is the crankshaft sound?;" and "will it clean up to a standard undersize?"

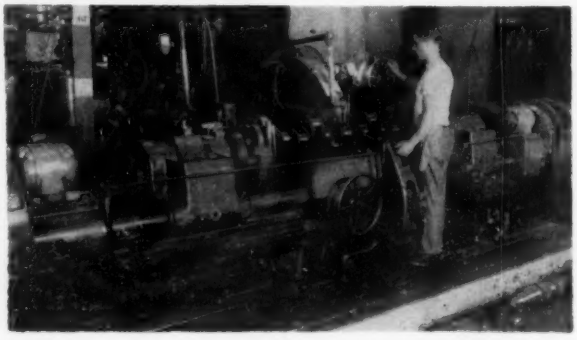
Magnetic inspection, or least examination, by the *Dye Check* or *Dye Line* methods is necessary to check for soundness. There must be no cracks or heat checks that go beyond the permissible depth of grind. Obvious flaws such as deep scores or badly galled areas are also a basis for rejection.

Dimensional checks are tricky. Wear may not be concentric around the correct center of the journal or pin. For example, maximum wear occurs on the bottom half of a crankpin as viewed in a top-stroke position. This must be remembered when checking to see that the shaft will clean up to a standard undersize. Fillet radii on previously reground shafts must be checked for sufficiency of stock. When insufficient in this critical area, it is a cause for rejection.

It's a heartbreaker to junk an expensive crankshaft, but if they won't pass these preliminary tests you are only spinning your wheels.

Backing up these field checks, Morco has an elaborate inspection setup at the plant and practically duplicate setups at its warehouses. When a used forging gets as far as the plant, they really give it a going over. The first step is the removal of all oil passage plugs. The holes are drilled to insure removal of all oil oxidation products, and any accumulations of carbon, dirt, metallic chips, etc.

Overall cleaning takes place in solvent baths, with Oakite Nos. 11 and 19 compounds used. This isn't



Heavy-duty, factory production-type grinders are used. Separate grinders are used for cranks and mains.

enough, however, if the most minute cracks are to be seen. The shaft is mounted in a turning jig and given a rough polishing. Emery belting in the familiar polishing "sticks" does the trick. Oil hole radii are also buffed since this is an area to watch closely. With everything clean and bright, the shaft is ready for *Magnaflux* testing.

All bearing surfaces are given a careful examination with special attention to areas that experience has shown to be critical. Experience is a big factor as every discontinuity found is not automatically a reason for reject. Very minor checks in non-critical areas, grain flow lines, and flaws that will clean up in grinding are allowed. Oil holes may be opened up to the engine builders maximum specification in an effort to eliminate minor cracks in that location.

Every effort is made to save the forging; but when any flaw is found that is a cause for rejection, the shaft is junked then and there. When cracks on bearing surfaces are bad enough to cause rejection, a "picture" is taken as a matter of record.

This "picture" business is interesting. The magnaflux compound is washed off with a little carbon tetrachloride and a piece of transparent cellulose tape the width of the journal is stuck over the spot. This is then carefully

peeled off and applied to a paper imprinted with a drawing of the journal. The compound at the crack adheres to the tape and gives a remarkably clear "picture" showing the extent and location of the fault.

Sound shafts are then given dimensional checks to verify that they can be reconditioned to the manufacturer's standard undersizes. GM shafts are normally finished to 0.010-, 0.020-, and 0.030-in undersizes. Cummins shafts are the same, plus a 0.040-in undersize. Deeper grinds are occasionally undertaken, but only when the customer so specifies and at his risk. It is up to him to get the non-standard undersize bearings.

Wear on thrust collars is determined and when beyond specifications for replacement shafts, the collars are replaced with new metal. Flywheel flange threaded holes and dowel holes are checked for size. Worn dowel holes are built up by welding and re-drilled. Threaded holes may be built up and re-tapped or repaired with *Heli-Coil* thread inserts. Loose keyways are built up by welding, while oil seal areas and gear fits are restored to proper size by spray metal.

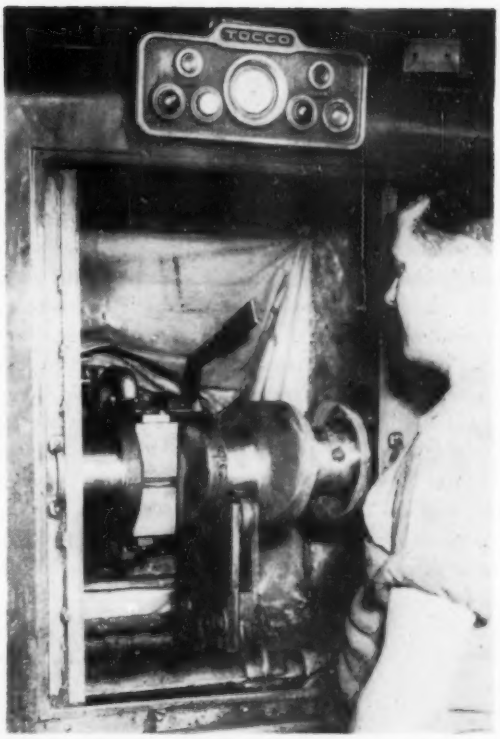
Another inspection involves straightness of the shaft. A pneumatic press applied at just the proper places brings the shaft within a maximum runout tolerance of 0.001 to 0.0015 in. As in the case of the magnetic testing, this is only the first of such operations. As many as six magnetic tests may be given to the shaft in the course of processing if thought necessary. Similarly straightening may take place at different steps if warranted.

Grinding

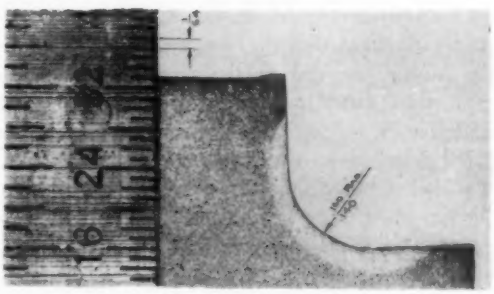
Using heavy high-production factory-type grinders, Morco gives each shaft a double grind. The first step is to get round, straight journals properly indexed and aligned. The second grind is for sizing and finish. With several grinders, one row for GM shafts and one for Cummins, it is possible to leave the grinding setups substantially intact. For example, journals are ground on one machine and then the shaft is moved to another for grinding the pins. With this type of operation it is possible to hold very accurate stroke measurements as the pot chucks used are always set for the particular shafts in production.

If stroke is not held accurately, it is a waste of time to strive for accurate connecting rod center-to-center distance. Most engine builders hold this dimension within a few thousandths; but what difference does it make if the shaft strokes are all over the lot? For full power and smooth operation in today's engines both stroke and rod length must be practically on the nose.

Getting back to the grinding, the first step is to locate the shaft in the machine. Morco prefers to locate on the gear fits and flywheel flange rather than on centers. The flywheel must run true and concentrically for good engine balance. The shaft was originally built that way, and when straight should be centered when the flange runs true. Gear fits normally show the least wear and are thus a good locating point.



Electrode around crankpin for hardening by Tocco process.



This tool crowds rollers seen into fillet area. Sectioned fillet shows increased density (light area) from rolling.

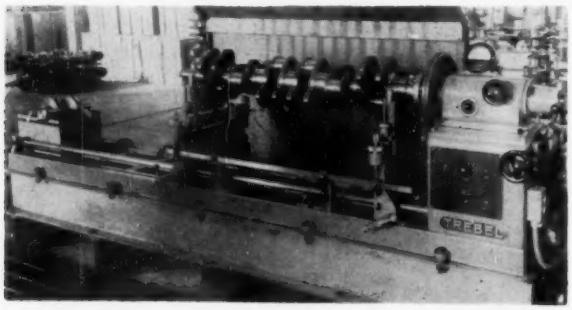
Grinding wheels the full width of the bearing are used on a plunge grind. The desired radii are dressed on the edges of the wheel. With selection of the proper grits, grinding speeds and depths of cut, heat can be controlled and finish assured. Heat control can be very important with hardened shafts.

TOCCO Hardening

Every shaft is checked for hardness on all bearing surfaces. One question when regrinding has always been, "How deep can I grind without taking off the hardened surface?" The answer is that the area is generally 0.125-in deep on a side with uniform hardness throughout. The whole thing though, is largely academic because the continual testing has shown that a high percentage of incoming shafts has had the hardness drawn to some degree, if not completely, in some journals.

Just about all the evils that ruin shafts cause heat and it is generally sufficient to draw the hardness. A poor regrind will often develop enough heat, particularly at the leading edge of a traverse grind, so that some of the hardness is lost. Modern horsepower outputs require the high-strength copper-lead or aluminum bearings. With these metals you need a hardened shaft or, alternatively, you can expect high wear rates.

Morco checks hardness by the scleroscope method or, in some cases, Rockwell testers. If hardness is below the



Degree and location of dynamic unbalance is determined by this machine. Metal is removed by drilling to correct.

engine builder's minimum specifications, the bearing surfaces are re-hardened by the TOCCO process.

Electrical induction is the principal of TOCCO hardening. An inductor is placed around the surface to be hardened and electricity at 3000 cps is applied for a predetermined number of seconds. Correct surface heating to the required depth occurs almost instantaneously. At the desired temperature, the current is automatically stopped and a water quench, supplied through passages in the inductor, follows. When all the surfaces are hardened, the shaft goes to a furnace where it is stress-relieved for a period of about four hours.

The hardened area is deliberately stopped short of the fillets. This retains the toughness and ductility at the critical fillet area.

Rolling Fillets

Take a look at the sectioned crank. It is obvious that the area between the fillets of the throw and journal has the least cross section, and this is further weakened by the oil hole. When flexing occurs, major deflection will be in this area. It's no wonder that the fillet area is the most critical and highly stressed portion of the shaft. That's why fillets are so important.

It's a well known principle that both hot and cold working of metal, resulting in compression, strengthens it. That's the idea behind forging or shot-peening. Morco gets the same effect by rolling under high pressure, the factory process used when making new shafts. The metal is compressed to the point where it might show a little light under a fillet gauge, but it's all there in dense, burnished form.

Balancing

The engine manufacturer uses balanced shafts, connecting rods, and pistons to get the smooth performance so necessary in today's engines. Now, what about the reground shaft? As in the case of holding stroke, there is no point in balancing rods and pistons unless the shaft is balanced too. The majority of the forgings received for reconditioning require it.

Two dynamic balancing machines are used at Morco. The points of unbalance are located both longitudinally and radially and corrected by drilling radially opposite the runout. Tolerances will, of course, vary with the size and type of shaft, but are usually held in the range of 0.5 to 1.5 oz in.

Polishing and Final Inspection

When sized on the grinder, bearing surfaces are left a shade on the high side. They are polished to exact undersize by using emery belts in "sticks" while the shaft is turned. Fillets and oil holes are similarly polished. Finish is held to 8-12 micro inches.

The final inspector now gets his chance at the shaft. He is set up with all the precision tools and gauges for a thorough check. All dimensions, of course, are verified. In addition, he rechecks for hardness to see that nothing was lost in grinding. Now that the pins are round and straight, it is a simple matter to verify that all the strokes are correct. Also, the indexing of the throws is checked.

Last Steps

When given the final OK, shafts are cleaned thoroughly and covered with a protective coating. Remember those oil hole plugs? They catch up with us here: they're put in a little bag and wired to the shaft. There is no excuse for installing a shaft with dirt in the oil holes that has been picked up later in storage or handling; they are wide open for cleaning right up to the time of installation.

Finally, the shaft gets its diploma—a year's factory-certified warranty. This is Morco's way of saying that they have done everything that they think is important in producing a good reground and reconditioned crankshaft. By following through the steps, we've gotten the answers to our questions.

Remember what we said before about areas of responsibility? The reconditioner has now done all that he can; now it's up to the user to see that the crankshaft gets the right conditions to show its stuff.

THE BUYERS' GUIDE

The Buyers' Guide is a service to our readers and to advertisers in Diesel Power. *Here will be found in a convenient list for quick reference diesel engines and accessories advertised in this magazine and a substantial number of other engines and products of leading manufacturers who advertise in this classified directory.*

DIESEL ENGINE DIRECTORY

Two-Cycle Diesel Engines

LOW SPEED, up to 365 r.p.m.

Horsepower, 101 to 500

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.

Horsepower, 501 to 1000

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.

Horsepower, Over 1000

BALDWIN-LIMA-HAMILTON CORP.
545 No. 3rd Street
Hamilton, Ohio
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin

MEDIUM SPEED, 365 to 700 r.p.m.

Horsepower, 51 to 100

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.

Horsepower, 101 to 500

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.

Horsepower, 501 to 1000

CLEVELAND DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.

Horsepower, over 1000

CLEVELAND DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin

MEDIUM HIGH SPEED, 700 to 1200 r.p.m.

Horsepower, 1 to 50

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
13400 W. Outer Drive
Detroit 28, Michigan
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
P & H DIESEL DIVISION
HARNISCHFEGER CORP.
500 So. Main St.
Crystal Lake, Illinois

Horsepower, 51 to 100

DETROIT DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
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Detroit 28, Michigan
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
P & H DIESEL DIVISION
HARNISCHFEGER CORP.
500 So. Main St.
Crystal Lake, Illinois

Horsepower, 101 to 500

CLEVELAND DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio
DETROIT DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Michigan
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
P & H DIESEL DIVISION
HARNISCHFEGER CORP.
500 So. Main St.
Crystal Lake, Illinois

Horsepower, 501 to 1000

DETROIT DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Michigan
FAIRBANKS, MORSE & CO.
600 S. MICHIGAN AVE.
Chicago 5, Ill.

Horsepower, over 1000

FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.

HIGH SPEED, over 1200 r.p.m.

Horsepower, 1 to 50

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
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600 S. Michigan Ave.
Chicago 5, Ill.

P&H DIESEL DIVISION
HARNISCHFEGER CORP.
500 S. Main St.
Crystal Lake, Ill.

Horsepower, 51 to 100

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600 S. Michigan Ave.
Chicago 5, Ill.

P & H DIESEL DIVISION
HARNISCHFEGER CORP.
500 So. Main St.
Crystal Lake, Illinois

Horsepower, 101 to 500

DETROIT DIESEL ENGINE DIVN.
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Detroit 28, Michigan

FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
P & H DIESEL DIVISION
HARNISCHFEGER CORP.
500 So. Main St.
Crystal Lake, Illinois

Horsepower, 501 to 1000

DETROIT DIESEL ENGINE DIVN.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Michigan

Four-Cycle Diesel Engines

LOW SPEED, up to 365 r.p.m.

Horsepower, 51 to 100

M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield 99, Ohio
WHITE-ROTH CORP.
Lorain, Ohio

Horsepower, 101 to 500

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
WORTHINGTON CORP.
Harrison, New Jersey

Horsepower, 501 to 1000

BRUSH ABOE, INC.
60-07 39th Avenue
Woodside 77, L.I., New York
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
N. Y., N. Y.
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Sts.
San Francisco 10, Calif.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
THE NATIONAL SUPPLY CO.
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1401 Sheridan Avenue
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
WORTHINGTON CORP.
Harrison, New Jersey

Horsepower, over 1000

BRUSH ABOE, INC.
60-07 39th Avenue
Woodside 77, L. I., New York

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
CHICAGO PNEUMATIC TOOL CO.
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18th & Florida Sts.
San Francisco 10, Calif.
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H. A. Stechel
149 Broadway
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1401 Sheridan Ave.
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
WORTHINGTON CORP.
Harrison, New Jersey

MEDIUM SPEED, 365 to 700 r.p.m.

Horsepower, 1 to 50

INTERNATIONAL SELLING CORP.
122 E. 42nd Street
New York 17, N. Y.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
WHITE-ROTH CORP.
Lorain, Ohio

Horsepower, 51 to 100

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.

Horsepower, 101 to 500

BRUSH ABOE, INC.
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THE BUDA COMPANY
(DIV. OF ALLIS CHALMERS MFG. CO.)
154th & Commercial Avenues
Harvey, Illinois
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York, N. Y.
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Sts.
San Francisco 10, Calif.

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New York 6, N. Y.
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Ave.
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
WORTHINGTON CORP.
Harrison, New Jersey

Horsepower, 501 to 1000

BALDWIN-LIMA-HAMILTON CORP.
545 No. 3rd Street
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BRUSH ABOE, INC.
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CHICAGO PNEUMATIC TOOL CO.
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Milwaukee 7, Wisconsin
WORTHINGTON CORP.
Harrison, New Jersey

Horsepower, over 1000

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San Francisco 10, Calif.
M.A.N.
H. A. Stechel
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1401 Sheridan Avenue
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NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
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Harrison, New Jersey

MEDIUM HIGH SPEED 700 to 1200 r.p.m.

Horsepower, 1 to 50

FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
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HERCULES MOTORS CORP.
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Canton 2, Ohio
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H. A. Stechel
149 Broadway
New York 6, N. Y.
WITTE ENGINE WORKS
OIL WELL SUPPLY, DIV.
UNITED STATES STEEL CORP.
1600 Oakand Ave.
Kansas City, Missouri

Horsepower, 51 to 100

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18th & Florida Streets
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600 S. Michigan Ave.
Chicago 5, Ill.
HERCULES MOTORS CORP.
11th & Market S.E.
Canton 2, Ohio
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.

Horsepower, 101 to 500

BRUSH ABOE, INC.
60-07 39th Avenue
Woodside 77, L. I., New York
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CHICAGO PNEUMATIC TOOL CO.
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THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana
ENTERPRISE ENGINE & MACH. CO.
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San Francisco 10, California
HERCULES MOTORS CORP.
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Canton 2, Ohio
INGERSOLL-RAND CO.
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M.A.N.
H. A. Stechel
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NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 7, Wisconsin
STERLING ENGINE COMPANY
1270 Niagara St.
Buffalo 13, N. Y.
WAUKESHA MOTOR CO.
P. O. Box 379
Waukesha, Wisconsin

Horsepower, 501 to 1000

BRUSH ABOE, INC.
60-07 39th Avenue
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CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
N. Y., N. Y.
THE COOPER-BESSEMER CORP.
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ENTERPRISE ENGINE & MACH. CO.
18th & Florida Sts.
San Francisco 10, California
INGERSOLL-RAND CO
11 Broadway
New York 4, N. Y.
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Ave.
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Avenue
Milwaukee 7, Wisconsin
STERLING ENGINE COMPANY
1270 Niagara St.
Buffalo 13, N. Y.
WAUKESHA MOTOR CO.
P. O. Box 379
Waukesha, Wisconsin

Horsepower, over 1000

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Sts.
San Francisco 10, California
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
NORDBERG MFG. CO.
3073 S. Chase Avenue
Milwaukee 7, Wisconsin

HIGH SPEED, over 1200 r.p.m.

Horsepower, 1 to 50

BRUSH ABOE, INC.
60-07 39th Avenue
Woodside 77, L. I., N. Y.
BUDA COMPANY
(DIV. OF ALLIS CHALMERS MFG. CO.)
154th & Commercial Avenues
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BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan
HALLETT MFG. CO.
1601 W. Florence Ave.
Inglewood, Calif.
HERCULES MOTORS CORP.
11th & Market S. E.
Canton 2, Ohio
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
WAUKESHA MOTOR CO.
P. O. Box 379
Waukesha, Wisconsin
WITTE ENGINE WORKS
OIL WELL SUPPLY, DIV.
UNITED STATES STEEL CORP.
1600 Oakland Ave.
Kansas City, Missouri

Horsepower, 51 to 100

BRUSH ABOE
60-07 39th Avenue
Woodside 77, L.I., New York
BUDA COMPANY
(DIV. OF ALLIS CHALMERS MFG. CO.)
154th & Commercial Avenues
Harvey, Illinois
CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan
CUMMINS ENGINE CO., INC.
Columbus, Indiana
FAIRBANKS, MORSE & CO.
600 S. Michigan Ave.
Chicago 5, Ill.
GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan
HERCULES MOTORS CORP.
11th & Market S. E.
Canton 2, Ohio
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
WAUKESHA MOTOR CO.
P. O. Box 379
Waukesha, Wisconsin

Horsepower, 101 to 500

BUDA COMPANY
(DIV. OF ALLIS CHALMERS MFG. CO.)
154th & Commercial Avenues
Harvey, Illinois
CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan
CUMMINS ENGINE CO., INC.
Columbus, Indiana
GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan
HERCULES MOTORS CORP.
11th & Market S. E.
Canton 2, Ohio
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
WAUKESHA MOTOR CO.
P. O. Box 379
Waukesha, Wisconsin

Horsepower, 501 to 1000

CUMMINS ENGINE CO., INC.
Columbus, Indiana
M.A.N.
H. A. Stechel
149 Broadway
New York 6, N. Y.
STERLING ENGINE COMPANY
1270 Niagara St.
Buffalo 13, New York

Horsepower, over 1000

STERLING ENGINE COMPANY
1270 Niagara St.
Buffalo 13, New York

. . . SUPPLIES, ACCESSORIES & EQUIPMENT

Adapters, Engine Indicator
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

Aftercoolers, Air Compressor
See also headings under "Coolers"
KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York
ROME-TURNEY RADIATOR COMPANY
Canal Street
Rome, New York
YOUNG RADIATOR CO.
Racine, Wisconsin

Aftercoolers, Supercharger
See also "Supercharger Intercoolers"
HARRISON RADIATOR DIVISION
GENERAL MOTORS CORPORATION
Washburn Street
Lockport, New York
KEWANEE-ROSS CORPORATION
1405 West Avenue
Buffalo 13, New York
YOUNG RADIATOR CO.
Racine, Wisconsin

Air Compressors
See also "Compressors, Air"; "Starting Units"
WORTHINGTON CORPORATION
Harrison, New Jersey

Air Compressors, Starting
See also "Starting Air Compressors"
WORTHINGTON CORPORATION
Harrison, New Jersey

Air Conditioners, Engine Driven
THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Frued Avenue
Detroit 14, Michigan

Air Dehydrators
J. F. PRITCHARD & COMPANY
210 W. 10 Street
Kansas City 5, Missouri

Air Dryers, Instrument
J. F. PRITCHARD & COMPANY
210 W. 10 Street
Kansas City 5, Missouri

Air Filters
See also "Cleaners"; "Filters, Air"
AIR MAZE CORP.
25000 Miles Road
Cleveland, Ohio
AMERICAN AIR FILTER CO., INC.
Central Avenue
Louisville 8, Kentucky
DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 4, Minnesota
FRAM CORPORATION
Providence 16, Rhode Island
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California
WINSLOW ENGINEERING CO.
4069 Hollis Street
Oakland 8, California

Air Filters, Automatic, Self-Cleaning
AMERICAN AIR FILTER CO., INC.
Central Avenue
Louisville 8, Kentucky
DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

Air Starting Motor, Diesel Engine
See also "Starting Motors, Diesel Air" "Cranking Motors, Air"
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio
SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Air Tools
See Also "Pneumatic Tools"
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

Air Velocity Meters
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle Street
Chicago 10, Ill.

Alarm Systems, Pressure & Temperature
See also headings under "Controls & Automatic"
AMOT CONTROLS CORPORATION
Richmond 1, California
FULTON SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee
PENN CONTROLS, INC.
Goshen, Indiana
SYNCHRO-START PRODUCTS, INC.
8151 North Ridgeway Ave.
Skokie, Illinois

Alternators
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Ammeters
See also "Meters, Electrical Indicating".
COLUMBIA ELECTRIC MFG. COMPANY
4537 Hamilton Avenue
Cleveland 14, Ohio

Anti-Rust Compounds
See also "Rust Preventatives"
CITIES SERVICE OIL CO.
70 Pine Street
New York 5, N. Y.

Asbestos, Sheet
See also headings under "Gaskets"
THE ANCHOR PACKING CO.
401 N. Broad St.
Philadelphia 8, Pa.
VICTOR MFG. & GASKET CO.
5750 Roosevelt Ave.
Chicago, Illinois

Automatic Controls Hydraulic
GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan

Automatic Controls, Starting
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Automatic Controls, Temperature
See also "Alarm Systems"
DETROIT CONTROLS CORP.
5900 Trumbull Ave.
Detroit, Michigan
GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan
FULTON SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee
PENN CONTROLS, INC.
Goshen, Indiana
THE POWERS REGULATOR CO.
3400 Oakton
Skokie, Illinois

Automotive Diesel Fuel
See also "Fuel Oil, Diesel"; "Oils, Diesel Fuel"; "Diesel Fuel Oils"; "Motor Fuels"
GULF OIL CORPORATION
1822 Gulf Building
Pittsburgh 30, Pennsylvania
STANDARD OIL COMPANY OF CALIF.
225 Bush Street
San Francisco 20, California
THE TEXAS COMPANY
135 East 42nd Street
New York 17, N. Y.

Automotive Greases
See also "Greases," "Lubricants"
GULF OIL CORPORATION
1822 Gulf Building
Pittsburgh 30, Pennsylvania
THE PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
STANDARD OIL COMPANY OF CALIF.
225 Bush Street
San Francisco 20, California
THE TEXAS COMPANY
135 E. 42nd Street
New York 17, N. Y.

Automotive Lubricating Oils
See also "Lubricating Oils"
GULF OIL CORPORATION
1822 Gulf Building
Pittsburgh 30, Pennsylvania
PURE OIL COMPANY
35 East Wacker Drive
Chicago, Illinois
STANDARD OIL COMPANY OF CALIF.
225 Bush Street
San Francisco 20, California
THE TEXAS COMPANY
135 East 42nd Street
New York 17, N. Y.

Auxiliary Combination Units
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, New York

NORDBERG MANUFACTURING CO.
3073 South Chase Avenue
Milwaukee 1, Wisconsin

Auxiliary Diesel Generating Sets

See also "Diesel Generating Sets"; "Emergency Diesel Generator"; "Emergency Lighting Plants".

ATLANTIC MANUFACTURING CO.
559 South 4th Street
Hamburg, Pennsylvania
THE BUDA COMPANY
(DIVISION OF ALLIS CHALMERS MFG. COMPANY)
154th & Commercial Avenues
Harvey, Illinois
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, New York
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California
THE NATIONAL SUPPLY COMPANY
1401 Sheridan Avenue
Springfield, Ohio
NORDBERG MANUFACTURING CO.
3073 South Chase Avenue
Milwaukee, Wisconsin
P & H DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 South Main
Crystal Lake, Illinois
THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan
R. H. SHEPPARD COMPANY, INC.
201 Middle Street
Hanover, Pennsylvania
STERLING ENGINE COMPANY
1270 Niagara Street
Buffalo 13, New York

Balancers, Dynamic, Non-Production Type

MERRILL ENGINEERING LABORATORIES
1240 Lincoln Street
Denver 3, Colorado

Balancing Machines

TAYLOR DYNAMOMETER & MACHINE COMPANY
6411 River Parkway
Milwaukee 13, Wisconsin

Ball & Roller Bearing Greases

See also "Greases" & "Lubricants"

TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York 4, N. Y.

Bars, Bronze

See also headings under "Bronze"

JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Batteries, Nickel Cadmium, Storage

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Massachusetts
NICKEL CADMIUM BATTERY CORP.
Pleasant Street
Easthampton, Massachusetts
NIFE, INCORPORATED
P.O. Box 187
Copiague, Long Island, New York

Batteries, Storage

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Massachusetts
DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Avenue
Anderson, Indiana
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
NICKEL CADMIUM BATTERY CORP.
Pleasant Street
Easthampton, Massachusetts
WILLARD STORAGE BATTERY COMPANY
246 East 131 Street
Cleveland 1, Ohio

Bearings

CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan

Bearings, Aluminum

AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Babbitted

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 S. Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING COMPANY
790 Eddy Street
San Francisco 9, California

Bearings, Babbitted and Bronze Bushed

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 S. Mill Street
New Castle, Pennsylvania

Bearings, Bronze

See also "Bronze Bearings"

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Bronze and Steel Backed, Babbitt-Lined

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING COMPANY
790 Eddy Street
San Francisco 9, California

Bearings, Copper-Lead

A. ALLAN & SON
325 Washington Avenue
Carlstadt, New Jersey
AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 S. Mill Street
New Castle, Pennsylvania

Bearings, Lead, Bronze

CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Piston Pin

See "Bearings Wrist Pin"

CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Ave.
Detroit 13, Michigan

Bearings, Self-Lubricating

JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Sleeve, Copper-Lead Lined

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Special Alloys

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
1700 St. Clair Avenue
Cleveland 10, Ohio

Bearings, Steel-Backed, Copper-Lead Lined

AMERICAN BEARING
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
1700 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bearings, Wrist Pin

See also "Bearings, Piston Pin"

CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORPORATION
11031 Shoemaker Avenue
Detroit 13, Michigan

Bellows, Brass
FLEXONICS CORPORATION
1363 S. Third Avenue
Maywood, Illinois

Bellows, Stainless Steel
FLEXONICS CORPORATION
1363 S. Third Avenue
Maywood, Illinois

Blowers, Centrifugal
BUFFALO FORGE COMPANY
490 Broadway
Buffalo 4, New York
ELLIOTT COMPANY
Jeannette, Pennsylvania
SCHWITZER-CUMMINS CO.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Blowers, Rotary, Positive
INTERSTATE DIESEL SERVICE, INC.
7120 Carnegie Avenue
Cleveland 3, Ohio
MIEHLE-DEXTER SUPERCHARGER DIVN.
THE DEXTER FOLDER COMPANY
100—4th St.
Racine, Wisconsin

Blowers, Scavenging and Supercharging
See Also "Superchargers"
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York
BUFFALO FORGE COMPANY
490 Broadway
Buffalo 4, New York
ELLIOTT COMPANY
Jeannette, Pennsylvania
MIEHLE-DEXTER SUPERCHARGER DIVN.
THE DEXTER FOLDER COMPANY
100—4th St.
Racine, Wisconsin
SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis, Indiana

Boilers, Exhaust Gas, Waste Heat
See also "Waste Heat Boilers"
THE SIMS COMPANY
Box 1096
Erie, Pa.

Bolts
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Bolts, High Tensile
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Brakes, Magnetic
STEARNS MAGNETIC, INC.
643 South 28th Street
Milwaukee 46, Wisconsin

Breather Filters
See also, "Air Filters, Crankcase"
DONALDSON CO., INC.
666 Pelham Blvd.
St. Paul 4, Minn.
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California
WINSLOW ENGINEERING CO.
4069 Hollis Street
Oakland 8, California

Bronze Bar Stock, Completely Finished
AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York

Bronze Bar Stock, Semi Finished
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bronze Bearings
See also "Bearings, Bronze"
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bronze Washers
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bushings, Bronze
AMERICAN BEARING CORPORATION
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bushings, High-Lead Bronze
AMERICAN BEARING CORPORATION
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bushings, Lead-Bronze Lined
AMERICAN BEARING CORPORATION
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bushings, Steel-Backed, Babbitt-Lined
AMERICAN BEARING CORPORATION
429 South Harding
Indianapolis, Indiana
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Cables, Battery
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
WILLARD STORAGE BATTERY CO.
246 East 131 Street
Cleveland 1, Ohio

Camshafts, Reground
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Carbon Solvents
See Also, "Solvents"
A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas
OAKITE PRODUCTS, INC.
22C Rector Street
New York 6, New York

Cast Camshafts
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Cast Crankshafts
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio
COOPER-BESSEMER CORPORATION
Mount Vernon, Ohio

Cast Iron Welding
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Casting, Bi-Metallic
FAIRCHILD ENGINE & AIRPLANE CORP.
ENGINE DIVISION
Hagerstown, Maryland

Castings
HUNT-SPILLER MFG. COMPANY
383 Dorchester Avenue
Boston 27, Mass.

Castings, Alloy Iron
COOPER-BESSEMER CORPORATION
Mount Vernon, Ohio
GILLIETT & EATON, INC.
Lake City, Minnesota

Castings, Aluminum
GILLIETT & EATON, INC.
Lake City, Minnesota
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio

Castings, Bronze & Brass
AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York

Castings, Centrifugal, Cylinder Sleeve
PERFECT CIRCLE CORPORATION
522 South Washington
Hagerstown, Indiana

Castings, Die
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio

Castings, Grey Iron
AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York
COOPER-BESSEMER CORPORATION
Mount Vernon, Ohio
EATON MANUFACTURING CO.
740 East 140th Street
Cleveland 10, Ohio
THE NATIONAL SUPPLY COMPANY
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Ave.
Springfield, Ohio

Casting Repairs
WASHINGTON IRON WORKS
Sherman, Texas

Castings, Steel (Med & Large)
ERIE FORGE & STEEL CORPORATION
16th & Cascade Streets
Erie, Pennsylvania

Catalytic Exhaust Fume Eliminators, Diesel—Gasoline

OXY-CATALYST, INC.
115 Conestoga Road
Wayne, Pennsylvania

Centrifugal Purifiers, Lube & Fuel Oil

See also headings under "Conditioners"; "Purifiers"; and "Separators"

CENTRICO, INC.
75 W. Forest Ave.
Englewood, New Jersey

THE DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Centrifuges, Oil Purifying

See heading above.

CENTRICO, INC.
75 W. Forest Ave.
Englewood, New Jersey

THE DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Chain Drives, Complete

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chains, Control

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Dual Engine Drive

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chains, Power Transmission

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chains, Roller

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chains, Silent

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chains, Timing

See also "Timing Chains"

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Chargers, Battery

WILLARD STORAGE BATTERY CO.
246 East 131 Street
Cleveland 1, Ohio

Chromium Plating

See also "Plating"

CLEVELAND HONE & MFG. COMPANY
8816 Harkness Road
Cleveland 6, Ohio

KOPPERS COMPANY, INC.
P.O. Box 298
Baltimore 3, Maryland

VAN DER HORST CORP. OF AMERICA
P.O. Box 557
Olean, N. Y.

Chromium Treated Parts

CLEVELAND HONE & MFG. COMPANY
8816 Harkness Road
Cleveland 6, Ohio

KOPPERS COMPANY, INC.
P. O. Box 298
Baltimore 3, Maryland

Clarifiers, Oil

See also headings under "Centrifugal Purifiers"; "Separators"

CENTRICO, INC.
75 W. Forest Ave.
Englewood, New Jersey

FRAM CORPORATION
Providence 16, Rhode Island

HONAN-CRANE CORPORATION
305 Wabash Avenue
Lebanon, Indiana

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Cleaners, Air, Oil Bath Type

See also headings under "Filters, Air" and "Silencers"

AMERICAN AIR FILTER COMPANY, INC.
201 Central Avenue
Louisville 8, Kentucky

DONALDSON COMPANY, INC.
666 Pelham Boulevard
St. Paul 4, Minnesota

VORTOX COMPANY
121 S. Alexander Avenue
Claremont, California

Cleaning Compounds

See also "Solvents", "Degreasers"

CLAYTON MFG. COMPANY
401 N. Temple City Boulevard
El Monte, California

THE CURRAN CORPORATION
Lawrence, Massachusetts

FINE ORGANICS, INC.
211 East 19th Street
New York 3, New York

OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.

Cleaning Machines, Diesel Engine Parts

THE CURRAN CORPORATION
Lawrence, Massachusetts

RUEMELIN MFG. COMPANY
3860 N. Palmer Street
Milwaukee 12, Wisconsin

VAPOR BLAST MFG. COMPANY
3025 W. Atkinson Avenue
Milwaukee 16, Wisconsin

Clutch Discs

AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches

FEDERAL SEAL & GEAR CORPORATION
522 Krueger Street
Kendallville, Indiana

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Ave.
Rockford, Illinois

Clutches, Air-Actuated

THE SNOW-NABSTEDT
GEAR CORPORATION
P. O. Box #1753
New Haven, Connecticut

Clutches, Automatic

FEDERAL SEAL & GEAR CORPORATION
522 Krueger St.
Kendallville, Indiana

THE HILLIARD CORPORATION
120 West 4th Street
Elmira, New York

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

POWDERMATIC CORPORATION
Newtown, Connecticut

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches, Free Wheeling

THE HILLIARD CORPORATION
120 West Fourth Street
Elmira, New York

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Clutches, Friction and Jaw

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches, Hydraulic

GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan

THE SNOW-NABSTEDT GEAR
CORPORATION
P.O. Box #1753
New Haven, Connecticut

Clutches, Magnetic

STEARNS MAGNETIC, INC.
643 South 28th Street
Milwaukee 46, Wisconsin

Clutches, Power Transmission

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Combustion, Diesel

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas

LANOVA CORP.
38-15 30th Street
Long Island City 1, N. Y.

P. & H. DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 S. Main Street
Crystal Lake, Illinois

Combustion Systems, Designs

LANOVA CORP.
38-15 30th St.
Long Island City 1, N. Y.

Combustion Systems, Tests

LANOVA CORP.
38-15 30th St.
Long Island City 1, N. Y.

Compression Testers, Diesel Engine

See also "Indicators, Diesel Engine".

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois

Compressors, Air

See also "Starting Units"

CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York, N. Y.

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio

MIEHLE-DEXTER SUPERCHARGER DIVN.
THE DEXTER FOLDING COMPANY
100—4th St.
Racine, Wisconsin

QUINCY COMPRESSOR CO.
217 Maine Street
Quincy, Illinois

WORTHINGTON CORP.
Harrison, New Jersey

Compressors, Reciprocating, Air and Gas, All Drives

CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York, N. Y.

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio

INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

WORTHINGTON CORP.
Harrison, New Jersey

Condensers

ROME-TURNEY RADIATOR COMPANY
Canal Street
Rome, New York

Condensers, Atmospheric Evaporative Steam & Vapor

YOUNG RADIATOR COMPANY
Racine, Wisconsin

Conditioners, Fuel & Lube Oil

See also "Centrifugal Purifiers"; "Purifiers"; "Separators"

HILLIARD CORPORATION
120 West 4th Street
Elmira, N. Y.

MORAN-EVIS MARINE SALES COMPANY
420 Market Street
San Francisco 11, California

WM. W. NUGENT & CO., INC.
410-412 N. Hermitage Ave.
Chicago 22, Illinois

WINSLOW ENGINEERING CO.
4069 Hollis Street
Oakland 8, California

Connecting Rods

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

ELLWOOD CITY FORGE CO.
10th Avenue
Ellwood City, Pa.

Connecting Rod Borers

See also "Rod Boring Machines"

VAN NORMAN COMPANY
3640 Main Street
Springfield, Massachusetts

Connecting Rod Pin Bushing Borer

VAN NORMAN COMPANY
3640 Main Street
Springfield, Massachusetts

Connecting Rods, Bolts & Nuts

ERIE BOLT & NUT CO.
1325 Liberty St.
Erie, Pa.

THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio

Connecting Rods, Forged

See also "Forgings"

ERIE FORGE & STEEL CORPORATION
16th & Cascade Streets
Erie, Pennsylvania

THE PARK DROP FORGE COMPANY
777 E. 79th Street
Cleveland 3, Ohio

Connecting Rods, Rebuilt

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Controls, Automatic Starting

See also "Automatic Controls"; "Alarm Systems"

AUTOMATIC SWITCH CO.
391 Lakeside Avenue
Orange, New Jersey

THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Illinois

Controls, Engine Safety

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin

FULTON-SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee

PENN CONTROLS, INC.
Goshen, Indiana

SYNCHRO-START PRODUCTS INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Controls, Fuel Governing Reverse Gear

THE MORSE INSTRUMENT CO.
21 Clinton Street
Hudson, Ohio

Controls, Hydraulic

GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan

Controls, Liquid Level

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

Controls, Locomotive

AMOT CONTROLS CORPORATION
21 Nevin Avenue
Richmond 1, California

Controls, Pneumatic

AMOT CONTROLS CORPORATION
21 Nevin Avenue
Richmond 1, California

POWERS REGULATOR COMPANY
3400 Oakton
Skokie, Illinois

Controls, Pressure

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

PENN CONTROLS, INC.
Goshen, Indiana

Controls, Remote

THE MORSE INSTRUMENT CO.
21 Clinton Street
Hudson, Ohio

SYNCHRO-START PRODUCTS, INC.
8151 North Ridgeway Avenue
Skokie, Illinois

Controls, Remote Throttle

THE MORSE INSTRUMENT CO.
21 Clinton Street
Hudson, Ohio

Controls, Single Lever Mechanical

THE MORSE INSTRUMENT COMPANY
21 Clinton Street
Hudson, Ohio

Controls, Temperature

AMOT CONTROLS CORPORATION
21 Nevin Avenue
Richmond 1, California

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin

FULTON SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee

ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10 Illinois

THE MORSE INSTRUMENT COMPANY
21 Clinton Street
Hudson, Ohio

PENN CONTROLS, INC.
Goshen, Indiana

THE POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Illinois

WESTON ELECTRICAL INSTRUMENT CORP.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Controls, Vacuum

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan

PENN CONTROLS, INC.
Goshen, Indiana

Converters, Torque

ALLISON DIVISION
GENERAL MOTORS CORP.
P. O. Box 894
Indianapolis 6, Indiana

TORCON CORPORATION
493 East 5th Street
Ashtabula, Ohio

Coolant Heaters

EDWIN L. WIEGAND
7665 Thomas Boulevard
Pittsburgh 8, Pennsylvania

Coolers, Compressed Air, Gas
See also "Aftercoolers"

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

J. F. PRITCHARD & CO.
210 W. 10th Street
Kansas City 5, Missouri

YOUNG RADIATOR CO.
Racine, Wisconsin

Coolers, Evaporative Type
See headings under "Evaporators".

BUFFALO FORGE COMPANY
490 Broadway
Buffalo 4, New York

MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

YOUNG RADIATOR COMPANY
Racine, Wisconsin

Coolers, Jacket Water
See also "Exchangers, Heat"; "Water Cooling Equipment"; and headings under "Heat Exchangers".

HARRISON RADIATOR DIV.
GENERAL MOTORS CORP.
Washburn Street
Lockport, New York

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

J. F. PRITCHARD & CO.
210 West 10 Street
Kansas City 5, Missouri

YOUNG RADIATOR CO.
Racine, Wisconsin

Coolers, Jacket Water, Materials For Cleaning
See also "Cleaning Compounds"; "Cleaners"; "Exchangers"

YOUNG RADIATOR CO.
Racine, Wisconsin

Coolers, Lube Oil, Materials For Cleaning

FINE ORGANICS, INC.
211 East 19th Street
New York 3, New York

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas

MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

YOUNG RADIATOR COMPANY
Racine, Wisconsin

Coolers, Oil, Water
See also "Water Cooling Equipment"; "Exchangers, Heat" and headings under "Heat Exchangers".

HARRISON RADIATOR DIV.
GENERAL MOTORS CORP.
Washburn Street
Lockport, New York

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

J. F. PRITCHARD & CO.
210 W. 10th Street
Kansas City 5, Missouri

THE SIMS COMPANY
P. O. Box 1096
Erie, Pennsylvania

YOUNG RADIATOR CO.
Racine, Wisconsin

Cooling Equipment, Engine Radiators
See also "Radiators"

ROME-TURNEY RADIATOR COMPANY
Canal Street
Rome, New York

YOUNG RADIATOR CO.
Racine, Wisconsin

Cooling, Fresh Water

GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan

Cooling System Filters & Conditioners

PERRY FILTER DIVISION
R. M. HOLLINGSHEAD CORP.
840 Cooper Street
Camden 2, New Jersey

Cooling Towers
See also "Spray Towers".

J. F. PRITCHARD & CO.
210 W. 10th Street
Kansas City 5, Missouri

Cooling Tower Fans

J. F. PRITCHARD & CO.
210 W. 10 St.
Kansas City 5, Missouri

Core Oils

CITIES SERVICE OIL CO.
70 Pine Street
New York, N. Y.

Cork Isolation

THE KORFUND CO., INC.
48-20A 32nd Place
Long Island City 1, N. Y.

Corrosion Inhibitors

MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

Couplings

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Chain

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Couplings, Cut-out Type

THE HILLIARD CORPORATION
120 W. 4th Street
Elmira, New York

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Couplings, Flexible

AJAX FLEXIBLE COUPLING CO., INC.
Portage & English Streets
Westfield, New York

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

ELLIOTT COMPANY
Jeannette, Pennsylvania

KOPPERS CO., INC.
P.O. Box 298
Baltimore 3, Maryland

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 7, Michigan

THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Flexible Shaft

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

KOPPERS CO., INC.
P.O. Box 298
Baltimore 3, Maryland

Couplings, Floating Shaft Type

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pa.

Couplings, Hose

STRATOFLEX, INC.
P. O. Box 10398
5255 River Oaks Blvd.
Fort Worth, Texas

Couplings, Hydraulic

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

THE WEATHERHEAD COMPANY
300 East 131st Street
Cleveland 8, Ohio

Couplings, Hydraulic Pipe

THE WEATHERHEAD COMPANY
300 East 131st Street
Cleveland 8, Ohio

Couplings, Hydraulic Self Sealing

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

Couplings, Hydraulic Self Sealing Quick Disconnect

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

Couplings, Pneumatic

THE WEATHERHEAD COMPANY
300 East 131st Street
Cleveland 8, Ohio

Couplings, Roller Chain

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

MORSE CHAIN COMPANY
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Couplings, Self-Aligning

AJAX FLEXIBLE COUPLING CO., INC.
Portage & English Streets
Westfield, New York

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Self Sealing

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Couplings, Slip

EATON MANUFACTURING CO.
740 East 140th Street
Cleveland 10, Ohio

Cranking Motors, Air
See also "Air Starting Motors"; "Starting Motors, Air"

LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Cranking Motors, Electric
See also "Starting Motors, Electric"
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Cranking Motors, Hydraulic
See also "Starting Motors"
HYDRAMOTIVE, INC.
2323 East 67th Street
Cleveland 4, Ohio

Crankshaft Bearings
CLEVELAND GRAPHITE BRONZE CO.
DIVISION OF CLEVITE CORP.
17000 St. Clair Avenue
Cleveland 10, Ohio
PIONEER MOTOR BEARING CO.
790 Eddy Street
San Francisco 9, California

Crankshaft Forgings
See also "Forgings"
THE PARK DROP FORGE CO.
777 East 79th Street
Cleveland 3, Ohio

Crankshaft Grinders
VAN NORMAN CO.
3640 Main Street
Springfield 7, Mass.

Crankshaft Machinists
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York
ELLWOOD CITY FORGE CO.
10th Avenue
Ellwood City, Pa.
WASHINGTON IRON WORKS
Sherman, Texas

Crankshaft, Repairs
See also "Repairs"
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5 N. Y.
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio
ERIE FORGE & STEEL CORP.
16th & Cascade Streets
Erie 1, Pennsylvania
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan
WASHINGTON IRON WORKS
Sherman, Texas

Crankshafts
ELLWOOD CITY FORGE CO.
10th Avenue
Ellwood City, Pa.
ERIE FORGE & STEEL COMPANY
16th & Cascade Streets
Erie, Pennsylvania
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan
OHIO CRANKSHAFT CO.
3800 Harvard Avenue
Cleveland 1, Ohio
WYMAN-GORDON COMPANY
105 Madison Street
Worcester, Mass.

Crankshafts Built-Up to Standard
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crankshafts, Hard Chromed & Ground
See also "Plating" & "Chrome"
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Crankshafts, Metallized
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Crankshafts Reground
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crankshafts Straightened
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Crankshafts, Thermit Welded
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Cutting Fluids
THE PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
STEVENS GREASE & OIL DIVISION
ALDRIDGE INDUSTRIAL OILS, INC.
3401 West 140th Street
Cleveland 11, Ohio
THE TEXAS COMPANY
135 E. 42d St.
New York 17, N. Y.

Cutting Oils
PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois

Cylinder Block Head Grinders
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Cylinder Boring Machines
CEDAR RAPIDS ENGINEERING CO.
902 17th Street, N. E.
Cedar Rapids, Iowa

Cylinder Heads
HUNT-SPILLER MFG. CORP.
383 Dorchester Avenue
Boston 27, Mass.

Cylinder Heads Repaired
RALPH STARK, INC.
43-12—33rd Street
Long Island City 1, New York

Cylinder Liners Reclaimed
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York
G & K DIESEL SERVICE
12 Atlantic Avenue
Boston 10, Massachusetts
VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Cylinder Liners Repaired
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Cylinder Sleeve Castings
See also "Castings"
PERFECT CIRCLE CORP.
522 South Washington
Hagerstown, Ind.

Cylinders
ERIE FORGE & STEEL CORP.
16th & Cascade Streets
Erie 1, Pennsylvania

Cylinders, Bored & Finished
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York

Cylinders, Repairs
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, New York
WASHINGTON IRON WORKS
Sherman, Texas

Decarbonizer, Nozzle Cleaning, Cold Immersion
THE CURRAN CORPORATION
Lawrence, Massachusetts

Damper, Torsional Vibration
See also "Vibration"
SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Degreaser, Engine Cleaning, Water Rinsing
See also "Solvents"
THE CURRAN CORPORATION
Lawrence, Massachusetts

Dehydrators, Diesel Fuel
WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa 8, Oklahoma

De-Ionizing Units, Water
MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

Detergents
See also "Degreasers"
OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.
STANDARD OIL CO. (INDIANA)
910 So. Michigan Avenue
Chicago 80, Ill.

Development, Diesel Engine
LANOVA CORP.
38-15 30th Street
Long Island City 1, N. Y.

Dew Point Meters
ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois

Diesel Electric Cleaner
FINE ORGANICS, INC.
211 East 19th Street
New York 3, New York

Diesel Engine Lubricating Oil
See also "Lubricating Oils"
ASHLAND OIL & REFINING COMPANY
1409 Winchester Ave.
Ashland, Kentucky
STANDARD OIL CO. OF CALIFORNIA
225 Bush Street
San Francisco, Calif.
THE TEXAS COMPANY
135 East 42nd Street
New York 17, N. Y.

Diesel Engines, Reconditioned
See also "Repairs Diesel"
BRODIE SYSTEM
115 Clifton Place
Brooklyn 5, N. Y.
CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
2160 West 106th Street
Cleveland 11, Ohio
A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, N. Y.
WASHINGTON IRON WORKS
Sherman, Texas

Diesel Exhaust Smoke Meters

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Diesel Farm Tractors

R. H. SHEPPARD COMPANY, INC.
201 Middle Street
Hanover, Pennsylvania

Diesel Fuel Oil

See also "Automotive Diesel Fuel"; "Fuel Oil, Diesel"; "Oils, Diesel Fuel"; "Motor Fuels".

ASHLAND OIL & REFINING COMPANY
1409 Winchester Ave.
Ashland, Kentucky
GULF OIL CORP.
1822 Gulf Building
Pittsburgh 30, Pa.
PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
SINCLAIR REFINING COMPANY
600 Fifth Avenue
New York 20, New York
TEXAS COMPANY
135 East 42nd Street
New York 17, New York
TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York 4, New York

Diesel Fuel Oil Tar & Carbon Dispersing Agent

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas
MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

Diesel Fuel Pump Calibrating Stands

See also "Test Stands"

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Diesel Generating Sets

See also "Auxiliary Diesel Generating Sets"; "Emergency Diesel Generators"; "Emergency Lighting Plants"; "Packaged Generators".

ATLANTIC MFG. CO.
559 S. 4th Street
Hamburg, Pennsylvania
THE BUDA COMPANY
DIVISION OF ALLIS-CHALMERS MFG. CO
154 & Commercial Avenues
Harvey, Illinois
BURMEISTER & WAIN AMERICAN CORPORATION
17 Battery Place
New York 4, New York
CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
2160 West 106th Street
Cleveland 11, Ohio
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
CUMMINS ENGINE CO., INC.
Columbus, Indiana
DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Mich.
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco 10, Calif.
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois
HALLETT MANUFACTURING COMPANY
1601 West Florence Avenue
Inglewood, California
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
D. W. ONAN & SONS, INC.
University Avenue S. E. at 25th
Minneapolis 14, Minnesota
P & H DIESEL DIVISION
HARNISCHFEGER CORPORATION
500 So. Main St.
Crystal Lake, Illinois
THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan
A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, N. Y.
R. H. SHEPPARD CO., INC.
201 Middle Street
Hanover, Pennsylvania

Diesel Industrial Tractors

THE BUDA COMPANY
DIVISION OF ALLIS-CHALMERS MFG. CO.
154th & Commercial Avenue
Harvey, Illinois
R. H. SHEPPARD CO., INC.
201 Middle Street
Hanover, Pennsylvania

Diesel Maintenance Tools

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Diesel Nozzle Testers

See also "Nozzle Testers", "Test Stands"

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
THE BUDA COMPANY
154th & Commercial Avenues
Harvey, Illinois
C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Diesel Power Units

See also "Power Units"

AMERICAN LOCOMOTIVE CO.
Schenectady 5, New York
ATLANTIC MFG. CO.
559 S. 4th Street
Hamburg, Pennsylvania
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
CUMMINS ENGINE CO., INC.
Columbus, Indiana
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California
FAIRBANKS MORSE & CO.
600 South Michigan Ave.
Chicago 5, Illinois
HERCULES MOTOR CORP.
101 Eleventh St., S.E.
Canton 2, Ohio
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
P. & H. DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 S. Main Street
Crystal Lake, Illinois
A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, N. Y.
R. H. SHEPPARD CO., INC.
201 Middle Street
Hanover, Pennsylvania

Diesel Pumping Units

See also "Pumping Units"

ATLANTIC MFG. CO.
559 S. 4th Street
Hamburg, Pennsylvania
THE BUDA COMPANY
DIVISION OF ALLIS-CHALMERS MFG. CO.
154th & Commercial Avenue
Harvey, Illinois
BURMEISTER & WAIN AMERICAN CORPORATION
17 Battery Place
New York 4, New York
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco 10, California
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois
HALLETT MFG. CO.
1601 West Florence Avenue
Inglewood, California
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 So. Chase Ave.
Milwaukee 7, Wisconsin
R. H. SHEPPARD CO., INC.
201 Middle Street
Hanover, Pennsylvania

Diesel Railway Generating Sets

COOPER-BESSEMER CORP.
Mount Vernon, Ohio
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield 99, Ohio
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
D. W. ONAN & SONS, INC.
University Avenue S.E. at 25th
Minneapolis 14, Minnesota
THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

Diesel Schools

UTILITIES ENGINEERING INSTITUTE
DIESEL DIVISION
2525 Sheffield Avenue
Chicago 14, Ill.

Diesel Testing Equipment

See also "Test Stands"

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Penna.
DIESEL PLANT SPECIALTIES CO.
424 Portage Avenue
Stevens Point, Wisconsin

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

Drilling Machines, Small Hole

TAYLOR DYNAMOMETER & MACHINE CO.
6411 River Parkway
Milwaukee 13, Wisconsin

Drills, Portable Electric

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Drives, Adjustable Speed

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

RELIANCE ELECTRIC & ENGINEERING CO.
1076 Ivanhoe Road
Cleveland 10, Ohio

Drives, Chain

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Mich.

Drives, Starter

ECLIPSE MACHINE DIVISION
BENDIX AVIATION CORP.
Elmira, New York

Dual Chain Engine Drives

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Dynamometers and Prony Brakes

EATON MANUFACTURING COMPANY
740 East 140th Street
Cleveland 10, Ohio

TAYLOR DYNAMOMETER & MACHINE CO.
6411 River Parkway
Milwaukee 13, Wisconsin

Dynamometers, Engine & Chassis

CLAYTON MFG. CO.
401 N. Temple City Blvd.
El Monte, California

Dynamometers, Tension

W. C. DILLON & CO., INC.
14620 Keswick Street
Van Nuys, California

Electrical Connectors

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Electroplating

VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Emergency Diesel Generator Systems

See also "Auxiliary Diesel Generator Sets"; "Diesel Generating Sets"; "Emergency Lighting Plants"; "Packaged Generators".

ATLANTIC MFG. CO.
559 S. 4th Street
Hamburg, Pennsylvania

BURMEISTER & WAIN AMERICAN CORPORATION
17 Battery Place
New York 4, New York

DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Mich.

ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California

FAIRBANKS MORSE & CO.
600 South Michigan Ave.
Chicago 5, Illinois

HALLETT MANUFACTURING COMPANY
1601 West Florence Avenue
Inglewood, California

D. W. ONAN & SONS, INC.
University Ave. S. E. at 25th St.
Minneapolis 14, Minnesota

P & H DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 So. Main St.
Crystal Lake, Illinois

THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, New York

R. H. SHEPPARD CO. INC.
201 Middle Street
Hanover, Pennsylvania

STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Emergency Lighting Plants

See also heading above.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
13400 West Outer Drive
Detroit 28, Michigan

ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California

D. W. ONAN & SONS, INC.
University Avenue S. E. at 25th
Minneapolis 14, Minnesota

P. & H. DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 S. Main Street
Crystal Lake, Illinois

THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, New York

STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Engine Bolts, Nuts & Studs

HARTFORD MACHINE SCREW CO.
P. O. Box 1440
Hartford 2, Connecticut

THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio

Engine Cooling System Cleaners

FRAM CORPORATION
Providence 16, Rhode Island

Engine Repair Stands

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Engineering Service, Diesel Engine

LANOVA CORPORATION
38-15 30th Street
Long Island City 1, New York

Engines, Diesel, Used

A. G. SCHOONMAKER COMPANY, INC.
50 Church Street
New York 7, New York

Evaporators

See also "Coolers"

MAXIM SILENCER CO.
85 Homestead Avenue
Hartford 5, Conn.

Evaporators, Steam

MAXIM SILENCER CO.
85 Homestead Ave.
Hartford 5, Conn.

Exchangers, Heat

See also "Water Cooling Equipment" and headings under "Coolers" and "Heat Exchangers".

AMERICAN LOCOMOTIVE COMPANY
Schenectady, New York

HARRISON RADIATOR DIVISION
GENERAL MOTORS CORP.
Washburn Street
Lockport, New York

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

J. F. PRITCHARD & COMPANY
210 West 10 Street
Kansas City 5, Missouri

EDWIN L. WIEGAND
7665 Thomas Blvd.
Pittsburgh 8, Pennsylvania

Exchangers, Heat, Materials for Cleaning

See also headings under "Cleaner"; "Cooler"; "Cooling"; and "Engine"

OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.

Exhaust Flexible Hose

See also headings under "Flexible"; "Hose"; and "Tubing"

DIESEL PLANT SPECIALTIES CO.
424 Portage Street
Stevens Point, Wisconsin

Exhaust Silencers

See also "Silencers"

BURGESS-MANNING CO.
749 E. Park Avenue
Libertyville, Illinois

Expansion Joints, Corrugated, Stainless Steel

FLEXONICS CORP.
1363 S. Third Ave.
Maywood, Illinois

Fan Drives, Thermostatically Controlled

SCHWITZER-CUMMINS CO.
1125 Massachusetts Avenue
Indianapolis, Indiana

Fans, Axial Flow

BUFFALO FORGE COMPANY
490 Broadway
Buffalo 4, New York

ROBBINS & MYERS, INC.
345 Lagonda Avenue
Springfield, Ohio

SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Fans, Centrifugal

BUFFALO FORGE COMPANY
490 Broadway
Buffalo 4, New York

SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Fans, Radiator Cooling

See also "Radiators"

KOPPERS COMPANY, INC.
P.O. Box 298
Baltimore 3, Maryland

SCHWITZER-CUMMINS CO.
1125 Massachusetts Ave.
Indianapolis 7, Indiana

Farm Implements

R. H. SHEPPARD CO., INC.
201 Middle Street
Hanover, Pennsylvania

Filter, Lube Oil, Magnetic

STEARNS MAGNETIC, INC.
643 South 28th Street
Milwaukee 46, Wisconsin

Filtering Systems

See headings under "Filters"

COMMERCIAL FILTERS CORPORATION
2 Main Street
Melrose 76, Massachusetts

HONAN-CRANE CORPORATION
305 Wabash Avenue
Lebanon, Indiana

WM. W. NUGENT & CO., INC.
410-412 North Hermitage Avenue
Chicago 22, Illinois

U.S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIV.
Thompson Road
Syracuse, New York

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa 8, Oklahoma

Filters, Air

See also "Air Cleaners"; "Air Filters"; and Headings under "Breathers".

AIR MAZE CORPORATION
25000 Miles Road
Cleveland, Ohio

AMERICAN AIR FILTER COMPANY, INC.
201 Central Avenue
Louisville 8, Kentucky

CUNO ENGINEERING CORP.
80 South Vine Street
Meriden, Conn.

FRAM CORPORATION
Providence 16, Rhode Island

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

WINSLOW ENGINEERING COMPANY
4069 Hollis Street
Oakland 8, California

Filters, Air, Automatic Self-Cleaned

AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio

AMERICAN AIR FILTER CO., INC.
201 Central Avenue
Louisville 8, Ky.

Filters, Air, Dry Type

AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio

AMERICAN AIR FILTER CO., INC.
201 Central Avenue
Louisville 8, Ky.

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

Filters, Air, Dry Type (Crankcase)

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

Filters, Air, Oil Bath Type

AIR MAZE CORP.
25000 Miles Road
Cleveland 5, Ohio

AMERICAN AIR FILTER CO., INC.
201 Central Avenue
Louisville 8, Ky.

VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, Air, Open-Screen Type

AIR MAZE CORP.
25000 Miles Road
Cleveland 5, Ohio

Filters, Air, Panel Type

AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, (Centrifugal) Lube Oil

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia, Penna.

Filters, Compressed Air

BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

COMMERCIAL FILTERS CORP.
2 Main Street
Melrose 76, Massachusetts

CUNO ENGINEERING CORP.
80 South Vine Street
Meriden, Connecticut

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

Filters, Engine Cooling System

PERRY DIVISION OF
R. M. HOLLINGSHEAD CORPORATION
840 Cooper St.
Camden, New Jersey

Filters, 5-Micron, Diesel Fuel

BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio

COMMERCIAL FILTERS CORPORATION
2 Main St.
Melrose 76, Massachusetts

THE HILLIARD CORPORATION
120 West 4th Street
Elmira, New York

HONAN-CRANE CORPORATION
305 Wabash Avenue
Lebanon, Indiana

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles 7, California

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa 8, Oklahoma

Filters, Fuel Oil

See also "Oil Filters".

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas

AIR MAZE CORPORATION
25000 Miles Road
Cleveland, Ohio

AMERICAN BOSCH CORP.
3664 Main Street
Springfield 7, Mass.

BRIGGS FILTRATION COMPANY
River Road
Washington 16, D. C.

C. A. V., DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio

COMMERCIAL FILTERS CORP.
2 Main Street
Melrose 76, Massachusetts

CUNO ENGINEERING CORP.
80 South Vine Street
Meriden, Conn.

FRAM CORP.
Providence 16, Rhode Island

THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.

HONAN-CRANE CORPORATION
305 Wabash Ave.
Lebanon, Indiana

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles, California

PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, N. Y.

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa 8, Oklahoma

WINSLOW ENGINEERING CO.
4069-73 Hollis Street
Oakland 8, Calif.

Filters, Gasoline

COMMERCIAL FILTERS CORP.
2 Main Street
Melrose 76, Massachusetts

CUNO ENGINEERING CORP.
80 South Vine Street
Meriden, Connecticut

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

FRAM CORP.
Providence 16, R. I.

THE HILLIARD CORPORATION
120 West 4th Street
Elmira, New York

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa 8, Oklahoma

WINSLOW ENGINEERING CO.
4069 Hollis Street
Oakland 8, California

Filters, Lubricating Oil

See also "Oil Filters".

AIR MAZE CORP.
25000 Miles Road
Cleveland 5, Ohio

BRIGGS FILTRATION COMPANY
River Road
Washington 16, D. C.

COMMERCIAL FILTERS CORP.
2 Main Street
Melrose 76, Mass.

CUNO ENGINEERING CORP.
80 South Vine Street
Meriden, Conn.

DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin

FRAM CORP.
Providence 16, Rhode Island

THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.

HONAN-CRANE CORP.
305 Wabash Avenue
Lebanon, Indiana

LUBER-FINER, INC.
25th & Grand Ave.
Los Angeles, California

PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 North Lewis Place
Tulsa, Oklahoma

WINSLOW ENGINEERING CO.
4059-73 Hollis Street
Oakland 8, Calif.

Filters, Lubricating Oil, Magnetic

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas

PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

STEARNS MAGNETIC, INC.
643 South 28th Street
Milwaukee 46, Wisconsin

U.S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

WINSLOW ENGINEERING CO.
4059-73 Hollis Street
Oakland 8, Calif.

Filters, Panel Type

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

Filter, Silencer Dry Type

DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

Fittings, Hose, Detachable

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

STRATOFLEX, INCORPORATED
5255 River Oaks Blvd.
Fort Worth, Texas

THE WEATHERHEAD COMPANY
300 East 131 Street
Cleveland 8, Ohio

Fittings, Hydraulic Tube

CHICAGO FORGING & MANUFACTURING COMPANY
2000 Southport Avenue
Chicago 14, Illinois

Fittings, Tube & Pipe

ANDERSON BRASS COMPANY
5308 Twelfth Street
Detroit 8, Michigan

Flexible Connections, Stainless Steel

See also headings under "Hose" and "Tubing"

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Connecticut

ATLANTIC METAL HOSE CO. INC.
309 Dyckman Street
New York 34, New York

Flexible Exhaust Connections

See also headings under "Hose" and "Tubing"

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Connecticut

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORP.
1363 South Third Avenue
Maywood, Ill.

Flexible Metal Hose

See also "Hose, Flexible, Metallic".

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Connecticut

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 South Third Street
Maywood, Illinois

HALLET MFG. COMPANY
1601 W. Florence Avenue
Inglewood, California

STRATOFLEX, INCORPORATED
5255 River Oaks Blvd.
Fort Worth, Texas

Flexible Metal Hose, Fuel Oil, Lubricating Oil, Compressed Air

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 South Third Avenue
Maywood, Illinois

STRATOFLEX, INCORPORATED
5255 River Oaks Blvd.
Fort Worth, Texas

Flexible Metal Hose, Fuel Oil, Lubricating Oil, Compressed Air & Water Lines

See also headings under "Hose" and "Tubing".

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Conn.

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 South Third Avenue
Maywood, Illinois

STRATOFLEX, INCORPORATED
5255 River Oaks Blvd.
Fort Worth, Texas

Forgings

ERIE FORGE & STEEL CORPORATION
16th & Cascade Streets
Erie 1, Pennsylvania

Forgings, Aluminum

WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Drop

AMERICAN BRAKE SHOE COMPANY
230 Park Avenue
New York 17, New York

WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Iron & Steel

WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Massachusetts

Forgings, Steel

ELLWOOD CITY FORGE COMPANY
10th Avenue
Ellwood City, Pennsylvania

Fuel Injection Systems, Repair & Service

See also "Service, Injection System"

INTERSTATE DIESEL SERVICE, INC.
7120 Carnegie Avenue
Cleveland 3, Ohio

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Fuel Oil Additives

See also "Conditioners"

DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin

Fuel Oil Conditioners

MORAN-EVIS MARINE SALES COMPANY
420 Market Street
San Francisco 11, California

Fuel Oil, Diesel

See also "Automotive Diesel Fuel"; "Oils, Diesel Fuels"; "Diesel Fuel Oil".

ASHLAND OIL & REFINING CO.
Ashland, Kentucky

CITIES SERVICE OIL CO.
70 Pine Street
New York 5, N. Y.

GULF OIL CORP.
GULF REFINING CO.
3702 Gulf Building
Pittsburgh 30, Pa.

THE PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois

STANDARD OIL CO. (Indiana)
910 South Michigan Ave.
Chicago 80, Illinois

THE TEXAS COMPANY
135 E. 42d St.
New York 17, N. Y.

Fuel Oil Heaters, Diesel

See also "Heaters".

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

EDWIN L. WIEGAND
7665 Thomas Boulevard
Pittsburgh 8, Pennsylvania

Gages, Air Pressure

ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York

Gages, Draft, Portable Indicating

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Gages, Fuel

THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio

ROCHESTER MANUFACTURING COMPANY, INC.
141 Rockwood Street
Rochester 10, New York

Gages, Liquid Level

THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York

Gages, Oil Pressure

THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York

Gages, Pressure

W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California

Gages, Tank Contents

DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York
VIKING PUMP COMPANY
4th & Jorgansen Streets
Cedar Falls, Iowa

Gages, Temperature

See also, "Thermometers".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York

Gages, Vacuum

THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York
SNAP-ON TOOLS CORPORATION
Kenosha, Wisconsin

Gaskets

THE ANCHOR PACKING CO.
401 North Broad St.
Philadelphia 8, Pa.
THE FITZGERALD MFG. CO.
Torrington, Conn.

Gaskets, Asbestos

See also, "Asbestos Sheet".
THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Gaskets, Cork

THE FITZGERALD MFG. CO.
Torrington, Conn.

Gaskets, Fibrous

THE FITZGERALD MFG. CO.
Torrington, Conn.

Gaskets, Metallic

THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Gaskets, Oil and Water

THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Gear Blanks, Forged

ERIE FORGE & STEEL CORPORATION
16th & Cascade Streets
Erie 1, Pennsylvania

Gear Lubricants

See also "Lubricants".
TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York, New York

Gearmotors

ELLIOTT COMPANY
Jeannette, Pennsylvania
RELIANCE ELECTRIC & ENGINEERING COMPANY
1076 Ivanhoe Road
Cleveland 10, Ohio

Gears, Cut

FEDERAL SEAL & GEAR CORP.
522 Krueger Street
Kendallville, Indiana
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Gears, Reduction

ALLISON DIVISION
GENERAL MOTORS CORP.
Post Office Box 894
Indianapolis 6, Indiana
FEDERAL SEAL & GEAR CORP.
522 Krueger Street
Kendallville, Indiana
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
THE SNOW-NABSTEDT GEAR CORP.
P. O. Box 1753
New Haven, Conn.

Generating Sets, Electric

See also "Diesel Generator Sets"; "Auxiliary Diesel Generating Sets"; "Emergency Diesel Generators"; "Emergency Lighting Plants"; "Packaged Generators"
ATLANTIC MANUFACTURING CO.
559 South 4th Street
Hamburg, Pennsylvania
CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York, New York
CUMMINS ENGINE CO., INC.
Columbus, Indiana
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco, California
FAIRBANKS MORSE & COMPANY
600 South Michigan Avenue
Chicago 5, Illinois
THE IDEAL ELECTRIC & MFG. CO.
First & Oak St.
Mansfield, Ohio
KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield, Ohio
NORDBERG MFG. CO.
3073 South Chase Avenue
Milwaukee, Wisconsin
D. W. ONAN & SONS, INC.
University Ave., S.E. at 25th
Minneapolis 14, Minnesota
P & H DIESEL ENGINE DIVISION
HARNISCHFEGER CORP.
500 South Main Street
Crystal Lake, Illinois
THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan
RELIANCE ELECTRIC & ENGINEERING CO.
1076 Ivanhoe Road
Cleveland, Ohio
A. G. SCHOONMAKER COMPANY, INC.
50 Church Street
New York, New York
STAR-KIMBLE MOTOR DIVISION
MIEHLE PRINTING PRESS & MFG. CO.
Department DP
200 Bloomfield Avenue
Bloomfield, New Jersey
STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Generators, A. C.

COLUMBIA ELECTRIC MFG. CO.
4519 Hamilton Ave.
Cleveland 14, Ohio
DELCO PRODUCTS DIVISION
GENERAL MOTORS CORP.
329 E. First St.
Dayton 9, Ohio
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.
ELLIOTT COMPANY
Jeannette, Pennsylvania
THE IDEAL ELECTRIC & MFG. CO.
First & Oak St.
Mansfield, Ohio
KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota
ROBBINS & MYERS, INC.
345 Lagonda Avenue
Springfield, Ohio
STAR-KIMBLE MOTOR DIVISION
MIEHLE PRINTING PRESS & MFG. CO.
Department DP
200 Bloomfield Avenue
Bloomfield, New Jersey

Generators, Charging

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield, Massachusetts
THE IDEAL ELECTRIC & MFG. CO.
First & Oak Street
Mansfield, Ohio
KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Generators, Charging, Direct Current Rectified A. C.

DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana
THE IDEAL ELECTRIC & MFG. CO.
First & Oak Street
Mansfield, Ohio
KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Generators, D. C.

C. A. V. DIVISION of
LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio

COLUMBIA ELECTRIC MFG. CO.
4519 Hamilton Avenue
Cleveland 14, Ohio

DELCO PRODUCTS DIVISION
GENERAL MOTORS CORPORATION
329 E. First Street
Dayton 9, Ohio

DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana

THE ELLIOTT COMPANY
Jeannette, Pennsylvania

THE IDEAL ELECTRIC & MFG. CO.
First & Oak Street
Mansfield, Ohio

KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road
Cleveland 10, Ohio

ROBBINS & MYERS, INC.
345 Lagonda Avenue
Springfield, Ohio

SAFETY CAR HEATING & LIGHTING CO., INC.
MARINE & COMMERCIAL DIVISION
Box 904-C
New Haven 4, Connecticut

STAR-KIMBLE MOTOR DIVISION
MIEHLE PRINTING PRESS & MFG. CO.
Department DP
200 Bloomfield Avenue
Bloomfield, New Jersey

Generators, Diesel-Driven (Mobile)

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORP.
LaGrange, Illinois

Generators, Diesel Driven (Stationary)

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORP.
LaGrange, Illinois

Generators, Engine Driven

ATLANTIC MFG. CO.
559 South 4th Street
Hamburg, Pennsylvania

THE BUDA COMPANY
DIVISION OF ALLIS CHALMERS MFG. CO.
154th & Commercial Avenue
Harvey, Illinois

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, New York

CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
2160 West 106th Street
Cleveland 11, Ohio

ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

THE IDEAL ELECTRIC & MFG. CO.
First & Oak Street
Mansfield, Ohio

KATO ENGINEERING CO.
1408 1st Avenue
Mankato, Minnesota

THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield, Ohio

P & H DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 South Main Street
Crystal Lake, Illinois

THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

SAFETY CAR HEATING & LIGHTING CO., INC.
MARINE & COMMERCIAL DIVISION
Box 904-C
New Haven 4, Connecticut

STAR-KIMBLE MOTOR DIVISION
MIEHLE PRINTING PRESS & MFG. CO.
Department DP
200 Bloomfield Avenue
Bloomfield, New Jersey

Governors, Hydraulic

THE MARQUETTE METAL PRODUCTS
1145 Galewood Drive
Cleveland 10, Ohio

WOODWARD GOVERNOR CO.
5001 N. Second St.
Rockford, Illinois

Governors, Overspeed

THE MARQUETTE METAL PRODUCTS
1145 Galewood Drive
Cleveland 10, Ohio

SYNCHRO-START PRODUCTS, INC.
8151 North Ridgeway Avenue
Skokie, Illinois

WOODWARD GOVERNOR CO.
5001 N. Second St.
Rockford, Illinois

Governors, Overspeed, Engine Shut-Off

SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

Governors, Regulating

WOODWARD GOVERNOR CO.
5001 North Second Street
Rockford, Illinois

Greases

See also "Lubricants"; "Automotive Greases".

CITIES SERVICE OIL CO.
70 Pine Street
New York, N. Y.

GULF OIL CORP.
1822 Gulf Bldg.
Pittsburgh 30, Pa.

PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois

SINCLAIR REFINING COMPANY
600 Fifth Avenue
New York 20, New York

STANDARD OIL COMPANY OF CALIF.
225 Bush Street
San Francisco 20, California

STEVENS GREASE AND OIL DIVISION OF ALDRIDGE INDUSTRIAL OILS, INC.
3401 West 140 Street
Cleveland 11, Ohio

THE TEXAS COMPANY
135 E. 42d St.
New York 17, N. Y.

Grey Iron and Steel Castings

EATON MANUFACTURING COMPANY
740 East 140th Street
Cleveland 10, Ohio

Grinders Valve Seat

See also "Valve Seat Grinders".

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Gun Greases

TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York, New York

Hardened & Ground Parts

MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Heat Exchangers, Air Cooled

See also, "Exchangers, Heat".

AMERICAN LOCOMOTIVE CO.
Schenectady, New York

J. F. PRITCHARD & CO.
210 W. 10 St.
Kansas City 5, Missouri

Heat Exchangers, Industrial

AMERICAN LOCOMOTIVE CO.
Schenectady, New York

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

J. F. PRITCHARD & CO.
210 West 10th Street
Kansas City 5, Missouri

Heat Exchangers, Oil and Water

See also headings under "Coolers"; "Exchangers, Heat"; "Water Cooling Equipment"; etc.

AMERICAN LOCOMOTIVE CO.
Schenectady, New York

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

J. F. PRITCHARD & CO.
210 West 10th Street
Kansas City 5, Missouri

ROME-TURNEY RADIATOR CO.
Canal Street
Rome, New York

THE SIMS COMPANY
Box 1096
Erie, Pa.

EDWIN L. WIEGAND
7665 Thomas Boulevard
Pittsburgh 8, Pennsylvania

Heat Recovery Silencers

THE MAXIM SILENCER CO.
85 Homestead Avenue
Hartford, Connecticut

Heat Treating

MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Heaters

EDWIN L. WIEGAND
7665 Thomas Boulevard
Pittsburgh 8, Pennsylvania

Heaters, Cab & Space

EDWIN L. WIEGAND
7665 Thomas Boulevard
Pittsburgh 8, Pennsylvania

Heaters, Feed Water

KEWANEE-ROSS CORP.
1405 West Avenue
Buffalo 13, New York

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

High Temperature Grease

TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York, New York

High Temperature Engine Cooling

ENGINEERING CONTROLS, INC.
1939 No. Hillhunst Avenue
Los Angeles 27, California

Honing Stones

C. ALLEN FULMER COMPANY
1211 1st Nat'l Bank Building
Cincinnati 2, Ohio

Honing Tools

C. ALLEN FULMER COMPANY
1211 1st Nat'l Bank Building
Cincinnati 2, Ohio

VAN NORMAN COMPANY
3640 Main Street
Springfield 7, Massachusetts

Horns, Air & Electrical

DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Hose, Metal For Steam, Oil, Compressed Air

See also headings under "Flexible Hose" and "Tubing".

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE BRANCH
698 S. Main Street
Waterbury 20, Conn.

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 South Third Avenue
Maywood, Illinois

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

STRATOFLEX, INC.
P. O. Box 10398
5255 River Oaks Blvd.
Fort Worth, Texas

Hoses & Hose Assemblies, Non-Metallic

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

STRATOFLEX, INC.
5255 River Oaks, Blvd.
Fort Worth, Texas.

THE WEATHERHEAD COMPANY
300 East 131st Street
Cleveland 8, Ohio

Hoses, Flexible Assemblies

ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 South Third Avenue
Maywood, Illinois

STRATOFLEX, INC.
P. O. Box 10398
5255 River Oaks Blvd.
Fort Worth, Texas

THE WEATHERHEAD COMPANY
300 North 131 Street
Cleveland 8, Ohio

Hoses, Flexible Metallic

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE BRANCH
698 S. Main Street
Waterbury 20, Conn.

ATLANTIC METAL HOSE CO. INC.
309 Dyckman Street
New York 34, N. Y.

FLEXONICS CORP.
1363 South 3rd Avenue
Maywood, Illinois

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

STRATOFLEX, INC.
5255 River Oaks, Blvd.
Fort Worth, Texas

Hoses, Flexible Wire Braid

AEROQUIP CORPORATION
300 South East Avenue
Jackson, Michigan

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Connecticut

ATLANTIC METAL HOSE CO. INC.
309 Dyckman Street
New York 34, N. Y.

FLEXONICS CORPORATION
1363 South Third Avenue
Maywood, Illinois

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

STRATOFLEX, INC.
5255 River Oaks Blvd.
Fort Worth, Texas

THE WEATHERHEAD COMPANY
300 East 131 Street
Cleveland 8, Ohio

Hydraulic Drives

ALLISON DIVISION
GENERAL MOTORS CORP.
Post Office Box 894
Indianapolis 6, Indiana

Hydraulic Fluids

SINCLAIR REFINING COMPANY
600 Fifth Avenue
New York 20, New York

Hydraulic Oils

TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York, New York

Hydraulic Test Pumps (Portable)

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

Hydraulic Torque Converters

ALLISON DIVISION
GENERAL MOTORS CORP.
Post Office Box 894
Indianapolis 6, Indiana

THE NATIONAL SUPPLY COMPANY
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield, Ohio

TORCON CORPORATION
493 East 5th Street
Ashtabula, Ohio

Ignition Systems, Fuel

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Ignition Systems, Gas Engine

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Mass.

DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Ignition Transformers

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Mass.

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Impact Wrenches

INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York

SNAP-ON TOOLS CORPORATION
Kenosha, Wisconsin

Indicator Valves

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Carbon Dioxide Portable

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

GOW-MAC INSTRUMENT CO.
100 Kings Road
Madison, New Jersey

Indicators, Card Drawing Type

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Diesel Engine

See also "Compression Testers, Diesel Engine", and other headings under "Indicators".

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois

Indicators, Diesel Engine Pressure

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Maximum Pressure

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Oxygen, Portable

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Pressure-Time, Diesel Engine

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Speed

See also, "Tachometers".

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road
Cleveland 10, Ohio

Induction Heating Equipment
OHIO CRANKSHAFT COMPANY
3800 Harvard Avenue
Cleveland 5, Ohio

Industrial Oils
See also headings under "Lubricants" and "Greases".
SINCLAIR REFINING COMPANY
600 Fifth Avenue
New York 20, New York
STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street
San Francisco 20, California

Industrial Wheel Tractors
R. H. SHEPPARD CO., INC.
201 Middle St.
Hanover, Pa.

Ingots and Billets
ERIE FORGE & STEEL CORPORATION
16th & Cascade Streets
Erie, Pennsylvania

Injection Systems, Fuel
A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas
AMERICAN BOSCH CORP.
3664 Main St.
Springfield 7, Mass.
C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
INTERSTATE DIESEL SERVICE, INC.
7120 Carnegie Avenue
Cleveland 2, Ohio
MICRO-PRECISION, INC.
2205 Lee Street
Evanston, Illinois
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, N. Y.
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Injection Systems, Service
See also "Fuel Injection Systems, Repair & Service"; "Service, Injection System"
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Injector & Pump Exchange
INTERSTATE DIESEL SERVICE, INC.
7120 Carnegie Avenue
Cleveland 2, Ohio

Injector Test Stand
See also "Nozzle Testers," "Test Stands".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Intake Silencers—Cleaners, Dry Type
See also "Silencers, Intake".
BURGESS-MANNING COMPANY
749 East Park Avenue
Libertyville, Illinois
DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York

Iron Plating
See also "Plating".
VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Laboratory, Diesel Engine
LANOVA CORP.
38-15 30th St.
Long Island City 1, N. Y.

Lapping Blocks
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Line Boring Machines
CEDAR RAPIDS ENGINEERING CO.
902 17th St., N.E.
Cedar Rapids, Iowa

Liners, Cylinder, Reclaimed
VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Liquid Honing Machines
VAPOR BLAST MFG. CO.
3025 W. Atkinson Avenue
Milwaukee 16, Wisconsin

Lock Nuts
COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

Locomotives, Diesel
See also "Diesel Locomotives"
AMERICAN LOCOMOTIVE CO.
Schenectady, New York
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois

Locomotives, Diesel-Electric
AMERICAN LOCOMOTIVE CO.
Schenectady, New York
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORPORATION
LaGrange, Illinois

Lubricants
See also "Industrial Oils", "Greases" and "Automotive Greases"
ASHLAND OIL & REFINING CO.
Ashland, Kentucky
GULF OIL CORP.
1822 Gulf Building
Pittsburgh 30, Pa.
PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
SINCLAIR REFINING COMPANY
600 Fifth Avenue
New York 20, N. Y.
THE TEXAS COMPANY
135 East 42 Street
New York 17, New York
TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York 4, New York

Lubricating Compounds
CITIES SERVICE OIL COMPANY
70 Pine Street
New York, New York
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Lubricating Oils
See also "Automotive Lubricating Oils"; "Oils Lubricating" and "Cylinder Oils".
ASHLAND OIL & REFINING CO.
Ashland, Kentucky
CITIES SERVICE OIL COMPANY
70 Pine Street
New York, New York
GULF OIL CORP.
1822 Gulf Building
Pittsburgh 30, Pa.
PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
SINCLAIR REFINING CO.
600 Fifth Ave.
New York 20, N. Y.
STANDARD OIL CO. OF CALIFORNIA
225 Bush Street
San Francisco 20, Calif.
STANDARD OIL CO. (INDIANA)
910 South Michigan Ave.
Chicago, Illinois
TIDE WATER ASSOCIATED OIL CO.
17 Battery Place
New York 4, New York

Lubricators, Force Feed
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Lubricators, Fresh Oil
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Lubricators, Mechanical
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Lubricators, Multiple Feed
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Lubricators, Sight Feed
MANZEL, INC.
315 Babcock Street
Buffalo 10, New York

Machine Shop Products
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Machine Tools
VAN NORMAN COMPANY
3640 Main Street
Springfield 7, Mass.

Machine Tools, Precision Honing
C. ALLEN FULMER CO.
1211 1st National Bank Bldg.
Cincinnati 2, Ohio
VAN NORMAN COMPANY
3640 Main Street
Springfield, Mass.
VAPOR BLAST MFG. CO.
3025 W. Atkinson Avenue
Milwaukee 16, Wisconsin

Magniflux Inspection Service
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Magnetos, High Tension
AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield, Mass.
C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Magnetos, Low Tension
AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Main Bearing-Thrust Flanges (Crankshaft)

CANNON BRONZE CORPORATION
4th & Washington Streets
Keithsburg, Illinois

Marine Diesel, Front Gear-Driven Accessories

FAIRBANKS MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois

P. & H. DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 S. Main Street
Crystal Lake, Illinois

Marine Reverse & Reduction Gears

ALLISON DIVISION
GENERAL MOTORS CORP.
P. O. Box 894
Indianapolis 6, Indiana

GRAY MARINE MOTOR COMPANY
710 Canton Avenue
Detroit 7, Michigan

THE SNOW-NABSTEDT GEAR CORP.
P. O. Box 1753
New Haven, Conn.

Meters, Electrical Indicating

See also "Ammeters"

BURLINGTON INSTRUMENT CO.
203 N. 3rd St.
Burlington, Iowa

WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, N. J.

Meters, Fuel Oil

NEPTUNE METER COMPANY
50 West 50th Street
New York 20, New York

Motor Fuels

See also "Automotive Diesel Fuel"; "Diesel Fuel Oil"; "Fuel Oil, Diesel"; "Oil, Diesel Fuel".

ASHLAND OIL & REFINING CO.
1409 Winchester Avenue
Ashland, Kentucky

CITIES SERVICE OIL CO.
70 Pine Street
New York, N. Y.

STANDARD OIL CO. OF CALIF.
225 Bush Street
San Francisco, California

Motor Generator Sets—Electro Plating, Low Voltage

COLUMBIA ELECTRIC MFG. CO.
4519 Hamilton Avenue
Cleveland 14, Ohio

THE IDEAL ELECTRIC & MFG. CO.
First & Oak St.
Mansfield, Ohio

Motors, Electric, A. C.

ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

Motors, Electric, A. C. & D. C.

DELCO PRODUCTS DIVISION
GENERAL MOTORS CORP.
329 East First Street
Dayton 9, Ohio

ELLIOTT COMPANY
Jeannette, Pennsylvania

THE IDEAL ELECTRIC & MFG. CO.
First & Oak St.
Mansfield, Ohio

KATO ENGINEERING CO.
1408 First Avenue
Mankato, Minnesota

RELIANCE ELECTRIC & ENGINEERING COMPANY
1088 Ivanhoe Road
Cleveland 10, Ohio

ROBBINS & MYERS, INC.
345 Lagonda Avenue
Springfield, Ohio

STAR-KIMBLE MOTOR DIVISION

MIEHLE PRINTING PRESS & MFG. CO.
200 Bloomfield Avenue
Bloomfield, New Jersey

Motors, Gear

See also, "Gearmotors".

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road
Cleveland 10, Ohio

Mufflers, Intake & Exhaust

See also headings under "Silencers".

BURGESS-MANNING COMPANY
749 East Park Avenue
Libertyville, Illinois

DONALDSON COMPANY, INC.
666 Pelham Boulevard
St. Paul 4, Minnesota

KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California

Mufflers, Spark Arresting

BURGESS-MANNING COMPANY
749 East Park Avenue
Libertyville, Illinois

KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California

Nozzle Cleaning Tools

See also, "Test Stands".

BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Nozzle Testers

See also "Injector Test Stand".

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield, Massachuetts

C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

Nozzles, Spray, Water Cooled

AMERICAN BOSCH CORP.
3664 Main Street
Springfield 7, Mass.

SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York

Nozzles, Spray, Water Cooling

See also "Spray Nozzles, Water".

J. F. PRITCHARD & CO.
210 West 10th Street
Kansas City 5, Mo.

Nuts, Lock

COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

Nuts, Plain & Castle

COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

HARTFORD MACHINE SCREW CO.
P. O. Box 1440
Hartford 2, Connecticut

Oil Conditioners

See also headings under "Centrifuges"; "Conditioners".

A. B. HYDROCARBON SYSTEMS
2808 McKinney
Dallas 4, Texas

THE HILLIARD CORP.
120 West 4th St.
Elmira, New York

MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

WM. W. NUGENT & COMPANY, INC.
410-412 North Hermitage Avenue
Chicago 22, Illinois

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

Oil Purification Systems, Filtering Earth Type

THE HILLIARD CORP.
120 W. Fourth St.
Elmira, N. Y.

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles 7, California

U. S. HOFFMAN CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

Oil Purification Systems Pressure and Gravity Types

THE BRIGGS FILTRATION COMPANY
River Road
Washington 16, D.C.

THE HILLIARD CORP.
120 W. 4th Street
Elmira, New York

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

U. S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
Thompson Road
Syracuse 6, New York

Oil Reclamation Systems

DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York

THE HILLIARD CORPORATION
120 West Fourth Street
Elmira, New York

WM. W. NUGENT & COMPANY, INC.
410-412 North Hermitage Avenue
Chicago 22, Illinois

Oil Seals & Grease Retainers

THE FITZGERALD MFG. CO.
Torrington, Conn.

VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Oil Separators

See also "Centrifuges"

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York

Oil Testing Equipment

AMERICAN LOCOMOTIVE CO.
Schenectady 5, New York

Oils, Diesel Fuel

See also "Automotive Diesel Fuel"; "Diesel Fuel Oil"; "Fuel Oil, Diesel"; "Motor Fuels".

ASHLAND OIL & REFINING CO.
1409 Winchester Avenue
Ashland, Kentucky

GULF OIL CORPORATION
1822 Gulf Building
Pittsburgh 30, Pa.

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles 7, California

PURE OIL COMPANY
35 East Wacker Drive
Chicago 1, Illinois
SINCLAIR REFINING CO.
600 Fifth Avenue
New York 20, New York
THE TEXAS COMPANY
135 East 42 Street
New York 17, New York

Packaged Generators

CHICAGO-PNEUMATIC TOOL CO.
6 East 44th St.
New York, New York
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco, California

Packing, Lead, Shredded

THE ANCHOR PACKING CO.
401 N. Broad St.
Philadelphia 8, Pa.

Packing, Oil Wiper

THE ANCHOR PACKING CO.
401 N. Broad St.
Philadelphia 8, Pa.
C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky

Packing, Rod Metallic

THE ANCHOR PACKING CO.
401 N. Broad St.
Phladelphia 8, Pa.
C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky

Packing Sheets

THE ANCHOR PACKING CO.
401 N. Broad St.
Philadelphia 8, Pa.
VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Packing, Sheets, Oil & Water

VICTOR MFG. & GASKET CO.
57-50 Roosevelt Ave.
Chicago, Illinois

Pipe Fittings, Compression

See also "Fittings".
THE WEATHERHEAD COMPANY
300 East 131 Street
Cleveland 8, Ohio

Piston Pin Bearings

See also "Bearings".
CLEVELAND GRAPHITE BRONZE CO.
DIVISION OF CLEVITE CORP.
17000 St. Clair Avenue
Cleveland 10, Ohio

Piston Pin Bushing Borer

VAN NORMAN COMPANY
3640 Main Street
Springfield, Massachusetts

Piston Pins

THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio
SEALED POWER CORPORATION
2001 Sanford St.
Muskegon 61, Michigan

Piston Ring Pot Castings

KOPPERS COMPANY, INC.
P. O. Box 298
Baltimore 3, Maryland

Piston Rings

C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky
DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
HUNT-SPILLER MFG. CORP.
383 Dorchester Avenue
Boston 27, Mass.
KOPPERS CO., INC.
P.O. Box 298
Baltimore 3, Maryland
PERFECT CIRCLE CORPORATION
522 South Washington
Hagerstown, Indiana
SAFETY SEAL PISTON RING CO.
P. O. Box 106
Fort Worth, Texas
SEALED POWER CORP.
2001 Sanford Street
Muskegon 61, Michigan
WAUSAU MOTOR PARTS CO.
1007 Harrison Boulevard
Wausau, Wisconsin
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Oil Control

C. LEE COOK MANUFACTURING CO.
916 South 8 St.
Louisville 3, Kentucky
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
KOPPERS COMPANY, INC.
P. O. Box 298
Baltimore 3, Maryland
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
WAUSAU MOTOR PARTS CO.
1007 Harrison Boulevard
Wausau, Wisconsin
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Sealing

C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky
DOUBLE SEAL RING CO.
2065 Montgomery Street
Fort Worth, Texas
KOPPERS CO. INC.
P.O. Box 298
Baltimore 3, Maryland
SAFETY SEAL PISTON RING CO.
P. O. Box 106
Fort Worth, Texas
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
WAUSAU MOTOR PARTS CO.
1007 Harrison Boulevard
Wausau, Wisconsin

Pistons

THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
ZOLLNER MACHINE WORKS
Beuter Road
Fort Wayne, Indiana

Pistons, Aluminum Alloy

GILLETT & EATON, INC.
Lake City, Minnesota
THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio
SEALED POWER CORP.
2001 Sanford Street
Muskegon 61, Michigan
ZOLLNER MACHINE WORKS
Beuter Road
Fort Wayne, Indiana

Pistons, Aluminum Alloy, Repaired

RALPH STARK, INC.
43-12—33rd Street
Long Island City 1, New York

Pistons, Cast Iron

GILLETT & EATON, INC.
Lake City, Minnesota
HUNT-SPILLER MFG. CORP.
383 Dorchester Avenue
Boston 27, Mass.
THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan

Pistons, Diesel Engine

ZOLLNER MACHINE WORKS
Beuter Road
Fort Wayne, Indiana

Pistons, Heavy Duty

ZOLLNER MACHINE WORKS
Beuter Road
Fort Wayne, Indiana

Plating, Chrome

KOPPERS COMPANY, INC.
P. O. Box 298
Baltimore 3, Maryland
VAN DER HORST CORP. OF AMERICA
1645 West State Street
Olean, New York

Plating, Iron

VAN DER HORST CORP. OF AMERICA
1645 West State Street
Olean, New York

Plating, Porous Chrome

VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Pneumatic Tools

See also "Air Tools".
CHICAGO PNEUMATIC TOOL CO.
6 East 44 Street
New York, New York

Portable Power Units

See also "Packaged Generators".
AMERICAN LOCOMOTIVE CO.
Schenectady 5, New York
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, New York
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco, California
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois
KATO ENGINEERING CO.
1408 First Avenue
Mankato, Minnesota
NORDBERG MFG. CO.
3073 So. Chase Avenue
Milwaukee 1, Wisconsin

P & H DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
500 S. Main Street
Crystal Lake, Illinois
THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan
A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, New York
STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Porus Chrome Plating

VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Power Plants, Automatically Controlled

ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco, California
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois
KATO ENGINEERING CO.
1408 First Avenue
Mankato, Minnesota
THE READY-POWER COMPANY
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan
A. G. SCHOONMAKER CO., INC.
50 Church Street
New York 7, New York

Power Take-Off Units

GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORPORATION
1301 18th Avenue
Rockford, Ill.
THE SNOW-NABSTEDT GEAR CORP.
P. O. Box 1753
New Haven, Connecticut

Power Units

AMERICAN LOCOMOTIVE CO.
Schenectady 5, New York
HERCULES MOTOR CORP.
101 11th St., S.E.
Canton 2, Ohio
KATO ENGINEERING CO.
1408 First Avenue
Mankato, Minnesota
R. H. SHEPPARD CO., INC.
Hanover, Pennsylvania
STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Pressure Switches

PENN CONTROLS, INC.
Goshen, Indiana

Pressuregraph

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Pullers, Gear, Bushing, Wheel, Bearing

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Pump Calibrating Test Stands

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Pumping Units, Diesel

See also "Diesel Pumping Units".

BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, N. Y.
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco, California
THE NATIONAL SUPPLY CO.
ENGINE DIVISION
(Mfgrs. of Superior & Atlas Engines)
1401 Sheridan Avenue
Springfield, Ohio

Pumps, Automatic Reversing

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Centrifugal

GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan

Pumps, Cooling Water

GRAY MARINE MOTOR CO.
710 Canton Avenue
Detroit 7, Michigan
SCHWITZER-CUMMINS CO.
1125 Massachusetts Ave.
Indianapolis, Ind.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Fuel Oil Injection

See also "Injection Equipment", etc.

AMERICAN BOSCH CORP.
3664 Main Street
Springfield 7, Mass.
C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
G & K DIESEL SERVICE
12 Atlantic Avenue
Boston 10, Massachusetts
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
MICRO-PRECISION, INC.
2205 Lee Street
Evanston, Illinois
SCINTILLA DIV.
BENDIX AVIATION CORP.
Sidney, N. Y.
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Pumps, Fuel Transfer

ECLIPSE MACHINE DIVISION
BENDIX AVIATION CORPORATION
Elmira, New York
THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio
MICRO-PRECISION, INC.
2205 Lee Street
Evanston, Illinois
GEO. D. ROPER CORP.
173 Blackhawk Park Avenue
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Pumps, Hydraulic

GEORGE D. ROPER CORPORATION
173 Blackhawk Avenue
Rockford, Illinois
TUTHILL PUMP CO.
939 East 95th Street
Chicago 19, Illinois
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Hydraulic Controls

GEORGE D. ROPER CORPORATION
173 Blackhawk Park Avenue
Rockford, Illinois
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

Pumps, Lubricating Oil

EATON MANUFACTURING COMPANY
740 East 140 Street
Cleveland, Ohio
THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio
GEO. D. ROPER CORP.
173 Blackhawk Avenue
Rockford, Ill.
SCHWITZER-CUMMINS CO.
1125 Massachusetts Avenue
Indianapolis 7, Indiana
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Oil

GEO. D. ROPER CORP.
173 Blackhawk Park Avenue
Rockford, Ill.
THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio
SCHWITZER-CUMMINS CO.
1125 Massachusetts Avenue
Indianapolis, Indiana
TUTHILL PUMP CO.
939 East 95th Street
Chicago 19, Illinois
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary Gear Type

INTERSTATE DIESEL SERVICE, INC.
7120 Carnegie Avenue
Cleveland 3, Ohio
GEO. D. ROPER CORP.
173 Blackhawk Park Avenue
Rockford, Ill.
SCHWITZER-CUMMINS CO.
1125 Massachusetts Avenue
Indianapolis, Indiana
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary, Vane-type

AMERICAN BRAKE SHOE CO.
230 Park Avenue
New York 17, New York
THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio

Pumps, Stripped Models

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Vacuum

QUINCY COMPRESSOR CO.
217 Maine Street
Quincy, Illinois

Purifiers, Fuel Oil

See also "Reclaimers, Oil"; and headings under "Oil".

THE BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

THE DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

FRAM CORP.
Providence 16, R. I.

THE HILLIARD CORP.
120 West 4th St.
Elmira, N. Y.

HONAN-CRANE CORP.
305 Wabash Avenue
Lebanon, Indiana

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Purifiers, Industrial Oil

See Heading Above.

THE BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

THE HILLIARD CORP.
120 W. 4th Street
Elmira, New York

HONAN-CRANE CORP.
305 Wabash Avenue
Lebanon, Indiana

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Purifiers, Lubricating Oil

See also "Reclaimers, Oil"; and headings under "Oil".

THE BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

THE DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

FRAM CORPORATION
Providence 16, Rhode Island

THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.

HONAN-CRANE CORP.
305 Wabash Avenue
Lebanon, Indiana

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles 7, California

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Purifiers, Oil

See heading above.

THE BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

THE DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

THE HILLIARD CORP.
120 West Fourth St.
Elmira, New York

HONAN-CRANE CORP.
305 Wabash Avenue
Lebanon, Indiana

LUBER-FINER, INC.
25th & Grand Avenue
Los Angeles 7, California

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Pyrometers, Exhaust

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Pyrometers, Portable

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Radiators, Engine Cooling

HARRISON RADIATOR DIV.
GENERAL MOTORS CORP.
Washburn Street
Lockport, Ill.

Rail Car Engines

STERLING ENGINE CO.
1270 Niagara Street
Buffalo 13, New York

Reclaimers, Oil

See also headings under "Purifiers" and "Oil".

THE HILLIARD CORP.
120 West 4th St.
Elmira, N. Y.

WILLIAM W. NUGENT & CO., INC.
410-412 N. Hermitage Avenue
Chicago 22, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Reclamation, Cylinder Liner

VAN DER HORST CORP. OF AMERICA
1645 East State Street
Olean, New York

Refrigeration, Engine-Driven

THE READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Avenue
Detroit 14, Michigan

Regrinding, Camshaft

MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Regulators, Current & Voltage

See also headings under "Voltage".

BURLINGTON INSTRUMENT CO.
203 West Third Street
Burlington, Iowa

DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Ave.
Anderson, Indiana

THE LEECE-NEVILLE CO.
5109 Hamilton Avenue
Cleveland 14, Ohio

SAFETY CAR HEATING & LIGHTING CO., INC.
MARINE & COMMERCIAL DIVISION
P. O. Box 904-C
New Haven 4, Connecticut

Regulators, Generator Voltage

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield, Massachusetts

BURLINGTON INSTRUMENT COMPANY
203 N. 3rd Street
Burlington, Iowa

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Regulators, Temperature

AMOT CONTROLS CORP.
21 Nevin Avenue
Richmond 1, Calif.

DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan

FULTON-SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee

PENN CONTROLS, INC.
Goshen, Indiana

THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Relays

AUTOMATIC SWITCH CO.
391 Lakeside Ave.
Orange, New Jersey

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

SYNCHRO-START PRODUCTS, INC.
8151 North Ridgeway Ave.
Skokie, Illinois

WESTON ELECTRICAL INSTRUMENT CORP.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Relays, Reverse Current—D.C.

SAFETY CAR HEATING & LIGHTING CO., INC.
MARINE & COMMERCIAL DIVISION
P. O. Box 904-C
New Haven 4, Connecticut

Repairs, Diesel

See also "Diesel Repairs"; "Diesel Engines Reconditioned".

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Reversing Switches

COLUMBIA ELECTRIC MANUFACTURING CO.
4519 Hamilton Avenue
Cleveland 14, Ohio

Rheostats, Plating Tank Type

COLUMBIA ELECTRIC MANUFACTURING CO.
4519 Hamilton Avenue
Cleveland 14, Ohio

Rocker Arm Boring Machine

HYDRO-BORER CO.
1601 E. Olympic Blvd.
Los Angeles 21, California

Rod Boring Machine
HYDRO-BORER CO.
1601 E. Olympic Blvd.
Los Angeles 21, California

Rotary Pumps
THE MARQUETTE METAL PRODUCTS CO.
1145 Galewood Drive
Cleveland 10, Ohio

Rotor Blower Service Tools
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Rust Preventives
See also "Anti-Rust Compounds"
OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.
SINCLAIR REFINING CO.
600 Fifth Avenue
New York 20, N. Y.
STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street
San Francisco 20, California

Rust Removers
OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.

Safety Controls, Engine
See also "Controls, Engine Safety"
AMOT CONTROLS CORP.
21 Nevin Avenue
Richmond 1, California
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
FULTON-SYLPHON DIVISION ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tennessee
PENN CONTROLS, INC.
Goshen, Indiana
POWERS REGULATOR COMPANY
3400 Oakton
Skokie, Illinois
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

Scale Removal
MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California
OAKITE PRODUCTS, INC.
22 C Rector St.
New York 6, N. Y.

Scales, Crane
W. C. DILLON & CO., INC.
14620 Koswick Street
Van Nuys, California

Screw Machine Products
COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
WEATHERHEAD COMPANY
300 East 131st St.
Cleveland 8, Ohio

Screw Machine Products, Hardened & Ground
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Scuffing Rings
A. ALLAN & SON
325 Washington Avenue
Carlstadt, New Jersey

Seals, Automatic Shaft
SCHWITZER-CUMMINS CO.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Seals, Shaft, Mechanical
SEALOL CORPORATION
45 Willard Avenue
Providence 5, Rhode Island

Self Retaining Nuts
See also "Nuts".
COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

Separators
See also headings under "Centrifuges"; "Conditioners"; "Purifiers"; "Clarifiers".
CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
DE LAVAL SEPARATOR CO.
Poughkeepsie, N. Y.

Separators, Magnetic
STEARNS MAGNETIC, INC.
643 So. 28th Street
Milwaukee 46, Wisconsin

Shafts, Carbon Alloy
ERIE FORGE & STEEL CORP.
15th & Cascade Streets
Erie 1, Pennsylvania

Shafts, Hardened and Ground
ELLWOOD CITY FORGE CO.
Ellwood City, Pennsylvania
ERIE FORGE & STEEL CORP.
15th & Cascade Streets
Erie 1, Pennsylvania
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Signals—Pressure, Liquid Level, Temperature
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Silencers, Air Filter, Intake
BURGESS-MANNING CO.
749 East Park Ave.
Libertyville, Ill.
DOLLINGER CORPORATION
10 Centre Park
Rochester 3, New York
FRAM CORPORATION
Providence 16, Rhode Island

Silencers, Exhaust
See also headings under "Mufflers".
BURGESS-MANNING CO.
749 East Park Ave.
Libertyville, Ill.
DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
MAXIM SILENCER CO.
85 Homestead Ave.
Hartford 5, Conn.
WINSLOW ENGINEERING CO.
4069-73 Hollis Street
Oakland 8, Calif.

Silencers, Intake
See heading above.
BURGESS-MANNING CO.
749 East Park Ave.
Libertyville, Ill.
DIESEL PLANT SPECIALTIES COMPANY
424 Portage Street
Stevens Point, Wisconsin
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
MAXIM SILENCER COMPANY
85 Homestead Avenue
Hartford 5, Connecticut

Smoke Meters
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Soft Grit Blast Machine (Carbon Removal)
REUMELIN MFG. CO.
3860 N. Palmer Street
Milwaukee 12, Wisconsin

Solvent, Engine Washing—Self Emulsifying
THE CURRAN CORPORATION
Lawrence, Massachusetts

Solvent, Parts Cleaning, Cold Immersion
THE CURRAN CORPORATION
Lawrence, Massachusetts

Solvents
See also "Degreasers".
ASHLAND OIL & REFINING CO.
1409 Winchester Avenue
Ashland, Kentucky
CITIES SERVICE OIL CO.
70 Pine Street
New York, N. Y.
THE CURRAN CORPORATION
Lawrence, Massachusetts
FINE ORGANICS, INC.
211 East 19th Street
New York 3, New York
GULF OIL CORP.
1822 Gulf Bldg.
Pittsburgh 30, Pennsylvania
STANDARD OIL CO. OF CALIF.
225 Bush Street
San Francisco, California

Solvents, Degreasing
See also "Degreasers"
THE CURRAN CORPORATION
Lawrence, Massachusetts
FINE ORGANICS, INC.
211 East 19th Street
New York 3, New York
OAKITE PRODUCTS, INC.
22 C Rector Street
New York, N. Y.

Solvents for Petroleum Residues
OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.

Spacers, Steel
FEDERAL-MOGUL CORP.
11031 Shoemaker Avenue
Detroit 13, Michigan

Spark Arrestors
BURGESS-MANNING CO.
749 E. Park Avenue
Libertyville, Illinois
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
MAXIM SILENCER CO.
85 Homestead Ave.
Hartford 5, Conn.

Spark Plugs, Diesel Starting
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Spark Plugs, Gas Engine
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
STITT IGNITION COMPANY
86 E. First Avenue
Columbus 1, Ohio

Special Maintenance Tools
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Speed Reducers and Increasers
FEDERAL SEAL AND GEAR CORP.
522 Krueger Street
Kendallville, Indiana
THE SNOW-NABSTEDT GEAR CORP.
P. O. Box 1753
New Haven, Conn.

Spindles
MUSKEGON MOTOR SPECIALTIES CO.
1747 Larch Street
Muskegon, Michigan

Spray Nozzles
J. F. PRITCHARD & COMPANY
210 W. 10th Street
Kansas City 5, Missouri

Spray Nozzles, Fuel Injection
See also under "Nozzles"; "Valves"
AMERICAN BOSCH CORP.
3664 Main St.
Springfield 7, Mass.
C. A. V. DIVISION of LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
MICRO-PRECISION, INC.
2205 Lee Street
Evanston, Illinois
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Spray Towers
See also "Cooling Towers".
J. F. PRITCHARD & COMPANY
210 W. 10th Street
Kansas City 5, Missouri

Sprockets
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana
MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Stands Engine
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Starter Drives
ECLIPSE MACHINE DIVISION
BENDIX AVIATION CORPORATION
Elmira, New York

Starting Air Compressors, Engine Driven
See also headings under "Compressors"
BURMEISTER & WAIN AMERICAN CORP.
17 Battery Place
New York 4, New York
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.

Starting Air Compressors, Motor Driven
See also headings above
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.

Starting Batteries, Storage
See also headings under "Batteries".
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Starting Motors, Air
See also "Air Starting Motors".
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Starting Motors, Electric
See also "Cranking Motors, Electric".
C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio
JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Starting Motors, Hydraulic
HYDRAMOTIVE, INC.
2323 E. 67th Street
Cleveland 4, Ohio

Steam Cleaning Equipment
CLAYTON MANUFACTURING CO.
401 N. Temple City Boulevard
El Monte, California
OAKITE PRODUCTS, INC.
22 C Rector Street
New York 6, N. Y.
LIVINGSTONE ENGINEERING CO.
100 Grove Street
Worcester 5, Mass.

Steel Castings
See also "Castings"; etc.
HUNT-SPILLER MFG. COMPANY
383 Dorchester Avenue
Boston 27, Mass.

Stops or Valves, 3-way & 4-Way
ANDERSON BRASS COMPANY
5308 Twelfth Street
Detroit 8, Michigan

Strainers, Oil
CUNO ENGINEERING CORP.
80 South Vine St.
Meriden, Conn.
ELLIOTT COMPANY
Jeannette, Penna.
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey
WINSLOW ENGINEERING CO.
4069 Hollis Street
Oakland 8, California

Strainers, Water
CUNO ENGINEERING CORP.
80 South Vine St.
Meriden, Conn.
WM. W. NUGENT & CO., INC.
410-412 W. Hermitage Avenue
Chicago 22, Illinois
WINSLOW ENGINEERING COMPANY
4069 Hollis Street
Oakland 6, California

Strainers, Water, Single & Duplex
CUNO ENGINEERING CORP.
80 S. Vine Street
Meriden, Connecticut
ELLIOTT COMPANY
Jeannette, Pennsylvania

Supercharger Intercoolers
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York

Supercharging Blowers
See also "Blowers, Scavenging and Supercharging"; "Turbochargers, Superchargers".
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York
MIEHLE-DEXTER SUPERCHARGER DIVN.
THE DEXTER FOLDER COMPANY
Racine, Wisconsin
SCHWITZER-CUMMINS CO.
1125 Massachusetts Ave.
Indianapolis, Ind.

Switches Automatic Transfer
AUTOMATIC SWITCH CO.
391 Lakeside Avenue
Orange, New Jersey

Switches, Manual
DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana

Switches, Solenoid
DELCO-REMY DIV.
GENERAL MOTORS CORP.
2401 Columbus Avenue
Anderson, Indiana
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Switches, Solenoid, Crane Overload
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California

Switches, Starting
DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana
LEECE-NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Switchgear
ELECTRIC MACHINERY & MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

Synchronizers, Automatic
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

Systems, Fuel Injection
See also headings under "Injection"; "Fuel"; "Nozzles", etc.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
MICRO-PRECISION, INC.
2205 Lee Street
Evanston, Illinois
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Tachometers, Centrifugal
HERMAN H. STICHT CO., INC.
27 Park Place
New York 7, New York

Tachometers, Electrical
HERMAN H. STICHT COMPANY, INC.
27 Park Place
New York 7, N. Y.
METRON INSTRUMENT COMPANY
432 Lincoln Street
Denver 3, Colorado
WESTON ELECTRICAL INSTRUMENT COMPANY
614 Frelinghuysen Avenue
Newark 5, New Jersey

Tachometers, Hand
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
HERMAN H. STICHT CO., INC.
27 Park Place
New York 7, New York
METRON INSTRUMENT COMPANY
432 Lincoln Street
Denver 3, Colorado

Tachometers, Mechanical
HERMAN H. STICHT CO., INC.
27 Park Place
New York 7, New York

Temperature Recorders
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Temperature Regulators, Cooling Water
AMOT CONTROLS CORP.
21 Nevin Ave.
Richmond, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit, Michigan
FULTON SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tenn.
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Test Stands, Diesel Fuel Injector
See also "Injector Test Stands"; etc.
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Test Stands, Diesel Fuel Pump
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Test Stands, Diesel Nozzle
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Testers, Battery
WILLARD STORAGE BATTERY CO.
245 East 131 Street
Cleveland 1, Ohio

Testing Instruments, Electrical
WESTON ELECTRICAL INSTRUMENT CORP.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Testing Instruments, Tensile
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California

Tests, Diesel Engine
LANOVA CORPORATION
38-15 30th Street
Long Island City 1, N. Y.

Thermocouples
ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Thermometers
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
POWERS REGULATOR COMPANY
3400 Oakton Street
Skokie, Illinois
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York
WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Thermometers, Bi-metallic, Glass
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California

Thermometers, Dial Indicator
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, N. Y.

Thermometers, Dial Indicating, Distance Type
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Thermometers, Flue Gas
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, N. Y.

Thermometers, Indicating
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
141 Rockwood Street
Rochester 10, New York
WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Thermometers, Laboratory
W. C. DILLON & COMPANY, INC.
14620 Keswick Street
Van Nuys, California

Thermometers, Portable Recording
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Timing Chains
See also "Chains, Timing"
MORSE CHAIN CO.
A BORG-WARNER INDUSTRY
7601 Central Avenue
Detroit 10, Michigan

Tool Chests, Roll Cabs
SNAP-ON TOOLS CORPORATION
Kenosha, Wisconsin

Tools, Diesel Engine Service
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Tools, Mechanic's Hand
SNAP-ON TOOLS CORP.
Kenosha, Wis.

Towers, Cooling
J. F. PRITCHARD & COMPANY
210 W. 10th Street
Kansas City 5, Missouri

Transmissions, Hydraulic
TORCON CORPORATION
493 E. 5th Street
Ashtabula, Ohio

Tubing, Corrugated, Flexible Metallic
See also headings under "Flexible" and "Hose".
THE AMERICAN BRASS CO.
AMERICAL METAL HOSE BRANCH
698 S. Main Street
Waterbury 20, Conn.
FLEXONICS CORPORATION
1363 South 3rd Ave.
Maywood, Illinois

Tubing, Finned
ROME-TURNEY RADIATOR COMPANY
Canal Street
Rome, New York

Tubing, Flexible Metal
See heading above.
AEROQUIP CORPORATION
300 S. East Avenue
Jackson, Michigan
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 S. Main Street
Waterbury 20, Conn.
FLEXONICS CORP.
1363 South 3rd Ave.
Maywood, Illinois

Tubing, Flexible, Non-Metallic
AEROQUIP CORPORATION
300 S. East Avenue
Jackson, Michigan
WEATHERHEAD COMPANY
300 East 131st St.
Cleveland 8, Ohio

Tubing, High Pressure
AEROQUIP CORPORATION
300 S. East Avenue
Jackson, Michigan
FLEXONICS CORPORATION
1363 S. Third Avenue
Maywood, Illinois

Turbochargers, Superchargers
See also headings under "Blowers"; "Supercharging Blowers"; "Scavenging Air Blowers".
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York
ELLIOTT COMPANY
Jeannette, Penna.
SCHWITZER-CUMMINS COMPANY
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Unit Injectors, Fuel Oil
AMERICAN BOSCH CORP.
3664 Main Street
Springfield 7, Mass.

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

JOHN M. WALTON, INC.
1050 Carondelet Street
New Orleans 13, Louisiana

Valve Adjusting Tool, Micrometric

P&G MANUFACTURING COMPANY
2262 North Albina Avenue
Portland 12, Oregon

Valves, Engine Indicator

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Valve Facing Machines

CEDAR RAPIDS ENGINEERING CO.
902 17th Street N.E.
Cedar Rapids, Iowa

Valve Guides

EATON MANUFACTURING COMPANY
740 East 140th St.
Cleveland 10, Ohio

Valve Guides, Bronze

FEDERAL-MOGUL CORP.
11031 Schoemaker Avenue
Detroit 13, Michigan

Valve Regrinders

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

VAN NORMAN COMPANY
3640 Main Street
Springfield 7, Mass.

Valve Seat Grinders

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

CEDAR RAPIDS ENGINEERING CO.
902 17th St. N.E.
Cedar Rapids, Iowa

Valve Seat Insert Tools

CEDAR RAPIDS ENGINEERING CO.
902 17th St. N.E.
Cedar Rapids, Iowa

Valve Seat Inserts

PETERSON WELDING LABS., INC.
1423 Virginia Avenue
Kansas City 6, Missouri

WAUSAU MOTOR PARTS CO.
1007 Harrison Boulevard
Wausau, Wisconsin

MARTIN WELLS
5886 Compton Avenue
Los Angeles 1, Calif.

Valve Seats

EATON MANUFACTURING CO.
740 East 140 Street
Cleveland 10, Ohio

PETERSON WELDING LABS., INC.
1423 Virginia Avenue
Kansas City 6, Missouri

Valves, Brass, Compression Flared

ANDERSON BRASS COMPANY
5308 Twelfth Street
Detroit 8, Michigan

Valves, Engine Indicator

KIENE DIESEL ACCESSORIES INC.
10352 Pacific Ave.
Franklin Park, Illinois

Valves, Fuel Line

ANDERSON BRASS COMPANY
5308 Twelfth Street
Detroit 8, Michigan

Valves, Packless

FULTON SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4, Tenn.

Valves, Solenoid Operated

AUTOMATIC SWITCH CO.
391 Lakeside Ave.
Orange, New Jersey

Valves, Special

ANDERSON BRASS COMPANY
5308 Twelfth Street
Detroit 8, Michigan

Valves, Thermostatic

AMOT CONTROLS CORP.
21 Nevin Ave.
Richmond, Calif.

THE POWERS REGULATOR COMPANY
3400 Oakton Street
Skokie, Illinois

Valves, 3-Way

AMOT CONTROLS CORP.
21 Nevin Avenue
Richmond 1, Calif.

THE WEATHERHEAD COMPANY
300 E. 131 Street
Cleveland 8, Ohio

Vapor Blast Machines

VAPOR BLAST MFG. COMPANY
3025 W. Atkinson Avenue
Milwaukee 16, Wisconsin

Variable Speed Drives

ALLISON DIVISION
GENERAL MOTORS CORP.
P. O. Box 894
Indianapolis 6, Indiana

ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minnesota

Vibration Control

THE KORFUND COMPANY, INC.
48-20A 32nd Place
Long Island City 1, New York

Vibration Eliminators

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE BRANCH
698 South Main Street
Waterbury 20, Connecticut

ATLANTIC METAL HOSE CO., INC.
307 Dyckman Street
New York 34, New York

FLEXONICS CORPORATION
1363 S. Third Avenue
Maywood, Illinois

THE KORFUND CO., INC.
48-20A 32nd Place
Long Island City 1, New York

Voltage Regulators

BURLINGTON INSTRUMENT CO.
203 W. 3rd St.
Burlington, Iowa

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

THE LEECE NEVILLE COMPANY
5109 Hamilton Avenue
Cleveland 14, Ohio

Volt-Ammeters, Clamp-on Type

WESTON ELECTRICAL INSTRUMENT CO.
614 Frelinghuysen Avenue
Newark 5, New Jersey

Water Conditioners

MORAN-EVIS MARINE SALES CO.
420 Market Street
San Francisco 11, California

Water Filters, Engine Cooling System

PERRY FILTER DIVISION
R. M. HOLLINGSHEAD CORP.
840 Cooper Street
Camden 2, New Jersey

Water Heaters, Waste Heat

THE PATTERSON-KELLEY CO., INC.
4167 Warren Street
East Stroudsburg, Pennsylvania

Water Separators & Filters Mechanical

FRAM CORPORATION
Providence 16, Rhode Island

WARNER LEWIS COMPANY
DIVISION OF FRAM CORPORATION
817 N. Lewis Place
Tulsa 8, Oklahoma

WINSLOW ENGINEERING COMPANY
4069 Hollis Street
Oakland 8, California

Water Temperature Regulators

See also "Temperature Regulators, Cooling Water"; "Regulators, Temperature".

AMOT CONTROLS CORP.
21 Nevin Avenue
Richmond, California

PENN CONTROLS
Goshen, Indiana

THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Wearing Rings

A. ALLAN & SON
325 Washington Avenue
Carlstadt, New Jersey

Welding, Diesel Parts

RALPH STARK, INC.
43-12 33rd Street
Long Island City 1, New York

WASHINGTON IRON WORKS
Sherman, Texas

Windshield Wipers, Electric

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Mass.

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Wire & Cable

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Wrenches

See also "Tools".

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Wrenches, Box, Open End

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Wrenches, Socket

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

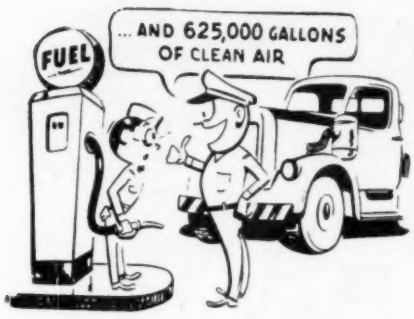
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Wrenches, Torque

JO-LINE TOOLS, INC.
8442 Otis Street
South Gate 27, California

SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

P. A. STURTEVANT COMPANY
Addison, Illinois



About That Engine Air....

Engine air—lack of it, too high or too low a temperature, or entrained dirt—can cost you money. Learn how you can avoid this.

YOUR engine is pretty critical of the air that it gulps in such huge quantities. It has to breathe just as you do and is probably more critical than your own respiratory system since it lacks the adaptability of the human machine. You take *your* breathing for granted, but don't take the engine's breathing so casually or you may be faced with a big fat bill.

Basically, your engine's air must be supplied in adequate quantities, must be clean, and should have somewhere near the proper temperature. There is plenty of air around, it looks pretty clean, and no one is doing anything about the weather but talking, so what's the pitch?

Actually, the statements are only relatively true and are oversimplifications. Some discussion may help you see what to do and why. It's important to *you* if you want to get the most out of your engine.

Adequate Air

To appreciate the volume of air required by your engine, suppose that you were to fill your tanks with 50 gal of diesel fuel. To burn this same amount of oil, you would need about 625,000 gal of air or approximately 83,500 cu ft, figured at standard conditions.

The actual volumes will of course vary somewhat with temperatures and altitudes, but it is a lot of air. You have to get it in and out of your engine. Air inlet restrictions or excessive exhaust back pressure will interfere with the engine's breathing and you may be in for high internal temperatures, loss of power and smoking, depending upon the extremity of the condition.

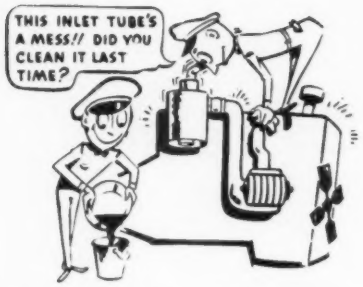
To get some idea as to the approach to these conditions, the following comments relate to Cummins engines. Measurements are specific to these engines, but the principles apply to all.

You can check back pressure with a manometer at the exhaust manifold outlet flange. Pressures at top rpm on normally-aspirated engines should not exceed 1-in of mercury or 1½-in on supercharged units. If the pressures are higher—too small a muffler, an excessive number of sharp bends in the piping, or crushed or bent tail pipes are some of the possible reasons. They suggest their own remedies.

Mufflers are important too. If they are too small, damaged or improperly designed, high back pressure may result. Avoid sharp bends in exhaust piping.

Air inlet restriction can also be measured with a manometer. It would be placed at the intake manifold in normally-aspirated engines and at the supercharger inlet connection when one is used. The engine is getting plenty of air if the manometer shows 7 to 14-in of water at a maximum governed speed. If it exceeds 18-in of water, it means "get busy".

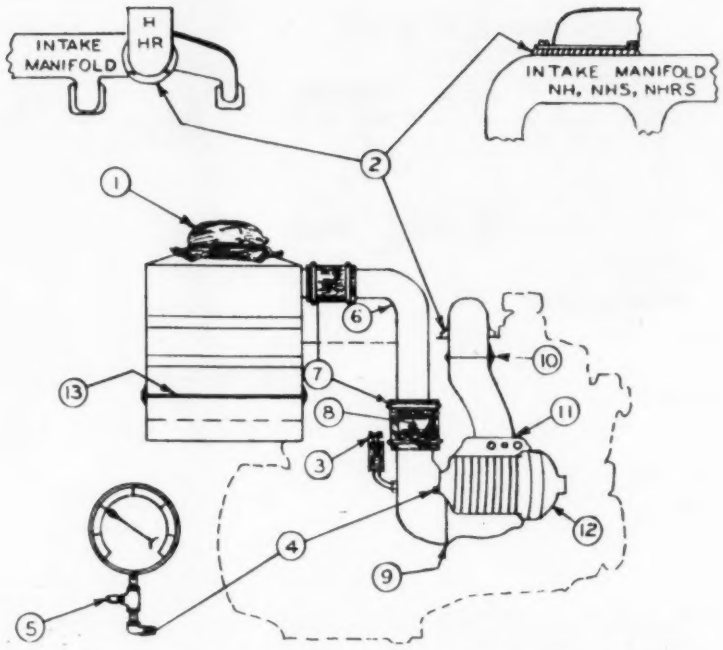
Check all pre-cleaners, screens, and air cleaners, cleaning them as necessary. These must all be clean to reduce pressure drops in the system. Watch the piping after the



Periodic cleaning is the remedy for dirt buildup in air cleaner intake piping. Dirt buildup reduces cleaner efficiency by restricting air flow.

Dust Concentration 3- or 4-ft above the hood is only a fraction as severe as the concentration at or below the hood.

One extra top overhaul takes a big bite out of the profits. Dirty intake air is the main cause of piston, ring, liner, and valve wear.



Pressure Checking Cummins Air Cleaning Systems For Leaks

1. Clamp piece of inner tube tightly over air cleaner inlet.
2. Install a sheet metal plate between the intake manifold and the air inlet connection.
3. Plug breather line.
4. Remove pipe plug from supercharger inlet connection or inlet casting and install the pressure gauge in this opening.
5. Pressurize system to 2 psi air pressure through air valve in T-connection. Use standard air compressor source if available.
6. Check for air leaks along pipe seams.
7. Look for faulty rubber hose connections or loose hose clamps.
8. Pipes must have seamless cuffs to prevent damage to rubber hose connections.
9. Check for and correct leaking gasket.
10. Replace "O" ring if leaking.
11. Check for loose capscrews or gasket leaks.
12. Rapid pressure drop may be due to faulty supercharger seals.
13. Leaks at this point are not important except for testing. Seal with rubber tape (if the "O" ring does not seal) during the pressure check only.

air cleaner for oily and/or carbonaceous accumulations that may be restricting the flow. The comments concerning the bends and mashed piping that applied to the exhaust lines also apply here.

With both ends of the system in good shape, the engine should get an adequate supply of air. One thing to remember is that air becomes thinner or less dense as altitude increases. You can't burn as much fuel completely in the cylinder so you must expect less power. Cut back on the fuel or you'll run into smoky exhaust. In truck applications use a lower gear.

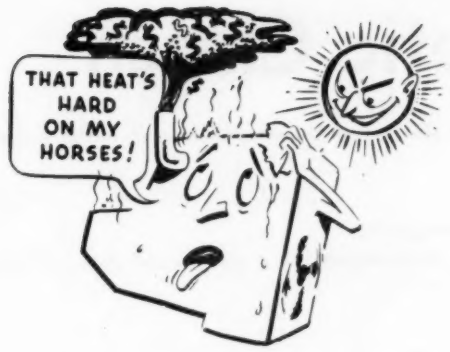
Clean Air

We've said it before and we'll say it again—Dirt is the engine's No. 1 enemy. Let's see what a little dirt can do. In a special test under controlled conditions, a half pound of dirt (about one handful) was fed into an engine's air intake at a uniform rate over a 150-hr period. After this short period of operation, the engine was using ten times more lubricating oil and when taken apart, showed wear conditions corresponding to 8000-10,000 hr of operation of a similar engine getting clean air.

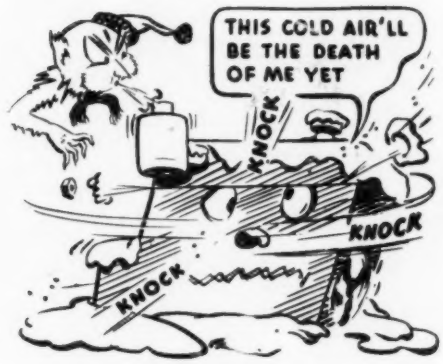
Obviously air cleaner efficiency is important. A good cleaner with sufficient air capacity and ability to hold a substantial dirt load must be used. To keep it efficient, it must be serviced correctly and regularly at intervals in line with the service conditions.

Some air is dirtier than others and you can't always pick the best spot for the engine to work. You can, however, locate the inlet in a spot where it picks up the least dirt. On a tractor, for example, a forward and high location might well keep the inlet away from the dust kicked up by the machine in motion. This has probably been figured into the original installation; but if you do make changes, bear in mind the comments concerning the sizing and shape of induction piping.

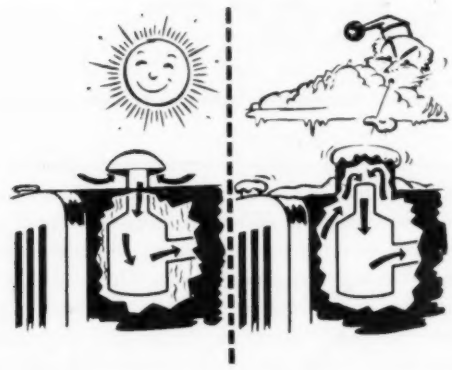
Now here's something that is generally overlooked. Be sure that *all* the air goes through the air cleaner. The amount of dirt mentioned earlier could well be pulled into the piping through a 1/8-in hole in the piping after



When intake air temperature climbs, engine horsepower output will drop. On the other hand . . . . .



air going to the engine at too low a temperature doesn't help either.



Taking air from the inside or the outside of the hood, depending on the weather, will help maintain more even temperatures.

used to connect a manometer for checking air inlet restriction. The sketch and caption give the testing procedure.

Air Temperature

If your intake air temperature goes above 90°F, you lose power and it's hard on the engine. The loss is about 1 per cent for each 10°F rise above the 90° mark. If the intake is under a hood, radiating engine heat and radiator fan blast can push the temperatures away up, particularly during the hot weather. Get the inlet out where it can get air that is as close as possible to ambient temperatures.

In cold temperatures, you may want to reverse the deal. These engines are rated at 90°F intake air. A drop of 60°F in the inlet air will reduce the compression temperature by 160°F. You can see what happens as temperatures go lower. Combustion will have a hard time starting, may be incomplete, and can produce knocking. It's going to boost operating costs no matter how you figure it.

The advantages of controlling temperatures have been recognized by both equipment builders and operators, with the result that a lot of modern equipment has provision for temperature control. If you don't have it, figure out a way to keep the inlet air temperature as close as possible to the 90° mark regardless of the seasonal conditions.

Summary

We've dealt with all these factors separately. It is pretty obvious that they are interrelated and that it would be

Proper attention to the air is money in the bank.

the air cleaner. It wouldn't take longer than the short period mentioned, particularly under dusty operating conditions. So how do you check for leaks? Cummins has worked out a kit for pressure-checking the air intake system. Test procedures apply to all Cummins engines with oil-bath air cleaners. In some models it may be necessary to drill and tap a 1/8-in pipe tap hole in the air inlet casting to take the pressure gauge. This hole can also be

silly to correct one condition at the expense of another. The whole problem must be considered at the same time and the best solution worked out.

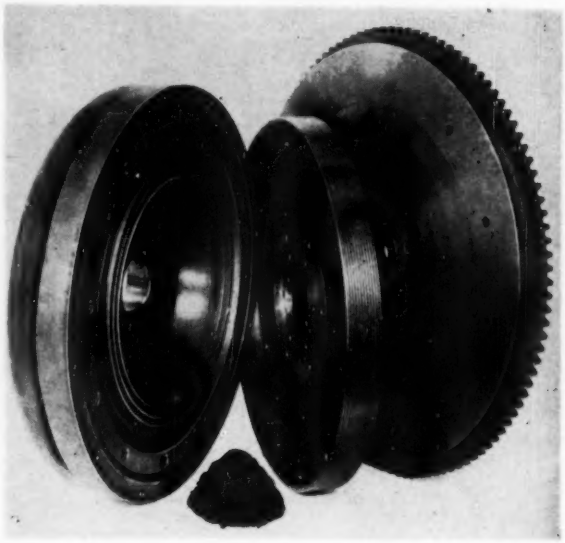
Then when you get a workable system, set up a realistic preventive maintenance schedule and stick with it. A plan is only the start; implementation is what counts. If you want to make those operational figures look good, start thinking about this. It will pay off.

Eaton's Magnetic Clutch

by Howard J. Findley *Manager of Research, Eaton Manufacturing Company*

Unique performance characteristics of the electro-magnetic power transmission principle offer many potential advantages for a wide field of application.

EARLY this year, Eaton added to its extensive patent coverage, foreign and domestic, on devices in which a mixture of magnetizable metal powder and dry lubricant is used as the clutching and releasing medium. The principle readily applies in such devices as clutches, brakes, drives, and other power transmitting and control units. This is the culmination of a number of years of research and experimentation during which Eaton developed the principle to the point where it is practical and efficient.



Components of Eaton's automotive main drive showing field, drum, powder and flywheel.

Fundamentals

Specifically, the Eaton principle applies to devices in which fine metallic particles mixed with dry additive lubricants are magnetized and drawn together in a strong load-transmitting bond when a magnetizing control current is applied. The mixture is literally "frozen" and "un-frozen" in direct proportion to the amount of current. Thus, precise control of rotating motion may be obtained either automatically or manually simply by the operation of a switch or rheostat.

Initial experiments indicated that the problem was to overcome an inherent drawback of an earlier magnetic-fluid clutch in which a wet mixture of powdered iron and oil was used. In the wet version, heat became a factor in the heavier duty applications. Oil broke down and resulting oxidation rendered the mixture useless. Viscous drag, sealing, and settling-out were also problems.

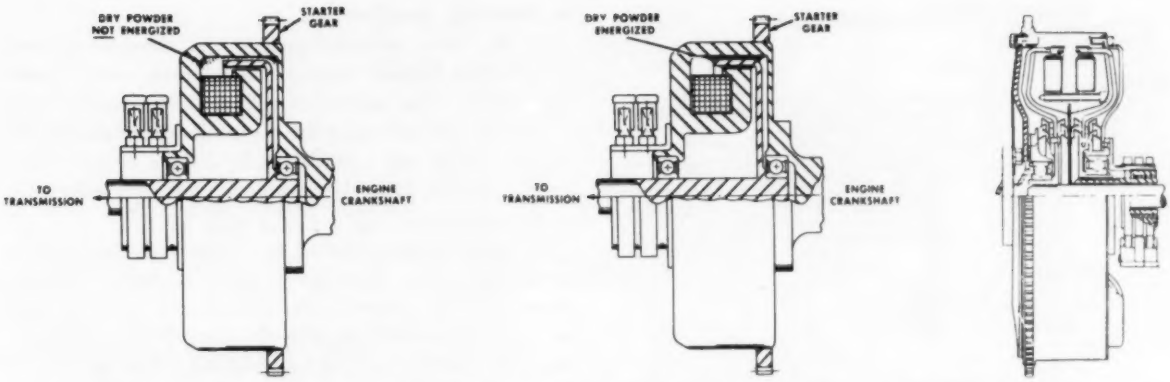
While developing a more durable and more efficient mixture, Eaton engineers uncovered the interesting fact that a dry lubricant—powdered graphite, for example—when mixed with powdered metal, overcame the serious limitations of the earlier wet mixture clutch. At first, this seemed paradoxical as graphite had long been recognized and widely used as a friction-eliminating lubricant. However, it proved to be completely effective. Viscous drag was reduced to negligible values; oxidation, sealing, and settling-out were no longer limitations. Several years of severe testing proved Eaton's powder mixtures are stable when subjected to high operating temperatures and are practically free from wear.

Three Basic Designs

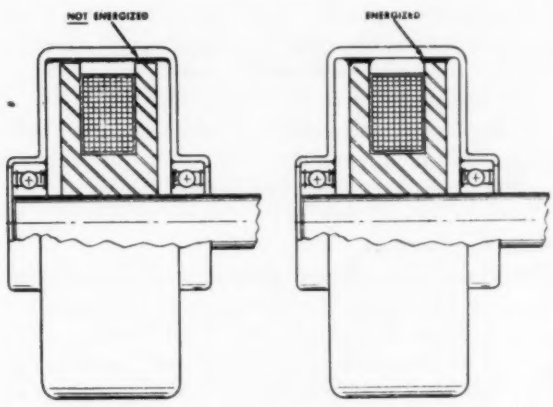
Eaton's electro-magnetic devices fit into three basic design groups. Two have a fixed air-gap between the two rotating members into which the magnetic powder and dry additive lubricant particles are magnetically drawn when current is applied. When de-energized, the powder collapses and remains out of contact with the rotating surfaces, allowing complete freedom from drag. The third type has a variable air-gap. It is somewhat similar to a disc-plate clutch in which the metal and dry additive lubricant particles are made into a lining through which magnetic lines of force are carried.

The three types are designated Types G, U and D, named for the sectional shapes of the field members. Types G and U (fixed air gaps) are recommended where considerable slipping service is encountered and where modulation and controllable speeds are required. Type D is intended primarily for on-off service.

Type U is generally used for heavy-duty service and is capable of being slipped smoothly and accurately for sustained periods without wear or other effects that would quickly ruin an ordinary clutch. It makes an ideal drive or brake where only a single clutch or brake is required.



Type-G automotive clutch in unenergized and energized condition. Also, a double unit making possible weight and space savings.



Type-U clutch shown unenergized and energized. This type may be slipped smoothly and accurately for sustained periods.

cooling fans, air conditioning equipment, air brake compressors, and for other on-off service. Its electrical speed of response is exceptionally fast.

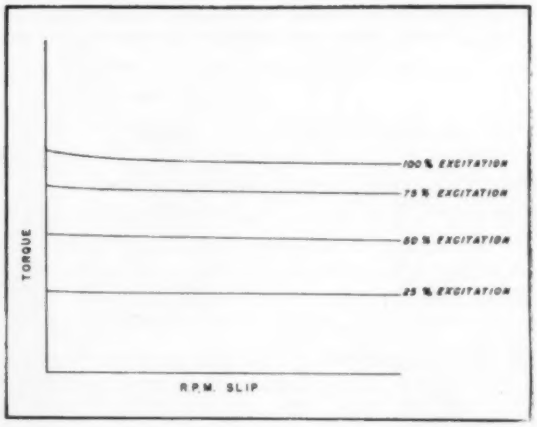
All three types can be made to satisfy any size requirement from tiny instrument units one or two inches in diameter to sizes several feet in diameter for use on the heaviest of equipment. Diameters and overall lengths are comparable to those of friction clutches of the same rated torque. They can be used for rotation in either direction, reversed at will, and either the shaft or the housing can be made the driven member.

All clutches can be furnished with coils wound for any voltage requirement. Current needed to operate any type at full torque is very low. Direct current is required for all three types except in the case of very small sizes or special designs.

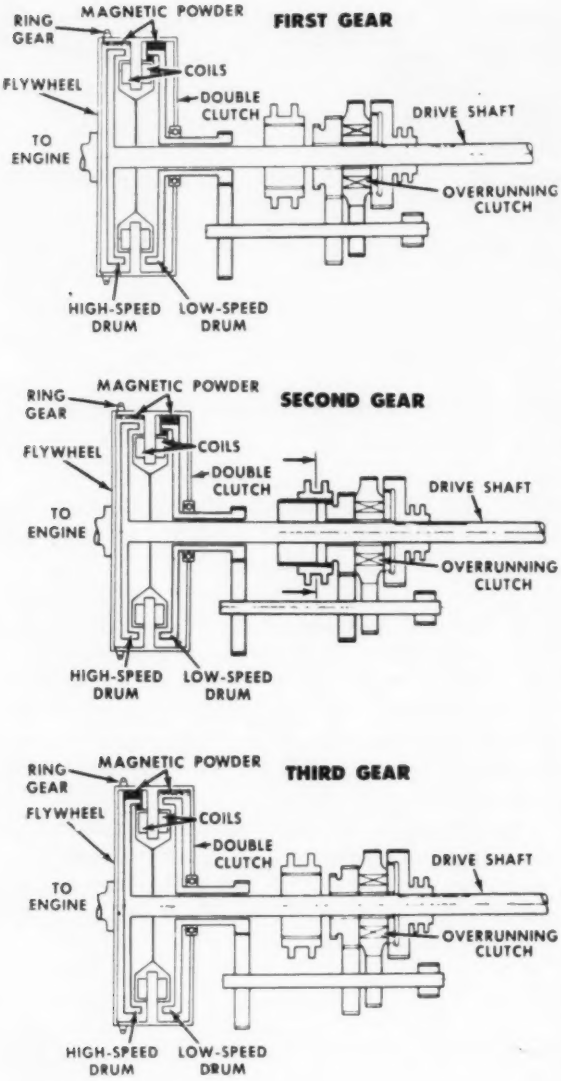
It is recommended where inertia is of little consequence as both members carry the magnetic flux and therefore must be of sufficient cross-section to do so.

Type G has characteristics similar to Type U, but has two outstanding features making it more adaptable to certain types of service. Inertia of one of the members can be kept relatively low and when space or weight is important, this design also permits combining as a double clutch or a clutch-brake combination in the same envelope. It is capable of being slipped without wear and is ideal for automotive main drive and other applications of similar nature. The torque characteristics of Types G and U are essentially flat; that is, the static or breakaway torque is substantially the same with a given excitation as the torque when slipping.

Type D is recommended for on-off service only, where maximum torque is important in a unit of minimum size, but where long sustained slipping conditions are not encountered. This type is being widely accepted and is well suited to such automotive applications as engine



Typical torque-slip curve shows absence of peaks at engagement point (zero slip) and flat response over wide slip range.



Power-flow diagram showing how simply a 3-speed transmission can be made. Many other gear arrangements are possible.

A Potential Application

Of the many potential uses in the automotive field, considerable interest centers around main drive clutch applications. The electro-magnetic clutch (usually Type G) can be used to replace the conventional pedal-operated friction clutch and with the addition of a few controls, transforms the manual transmission into an automatic or semi-automatic.

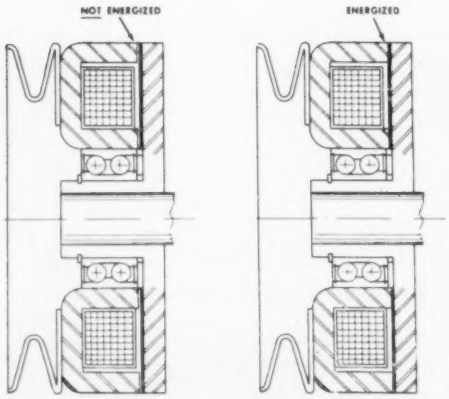
A tandem arrangement of two Type G clutches with a simple gear box becomes a superior fully-automatic power shifting transmission. Almost any desired gear arrangement is possible with this form of dual electro-magnetic clutch combination. In effect, it simplifies the design of a multi-speed transmission.

Starts in any gear may be made through one of the clutches. At proper vehicle speed, the other clutch brings the next gear into play. Continuing this alternating process, which Eaton engineers call "laddering", any gear sequence is possible. With one clutch driving, the other is prepared and ready for the next ratio. Transfer of power from one clutch to the other is so smooth and uninterrupted that it is scarcely perceptible. Under all conditions when the vehicle is underway, the Eaton clutch "locks up" transmitting 100 per cent of the power applied; there is no power loss due to slippage.

Wide Application

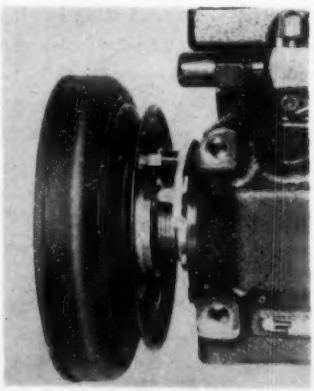
Simplicity of design and construction of these clutches add up to a minimum of maintenance and comparatively low initial cost. Fast, responsive control of either output speed or torque can be accomplished with simple remote or automatic controls. This feature in itself provides wide flexibility of application.

Operationally, there are valuable characteristics to be applied to modern machinery. Smooth engagement, modulation of slip speed, and positive lockup without slip are performance features that meet practically any operating condition. These transmission devices are a valuable tool for today's designers for they can be used advantageously in many widely varied engineering fields.



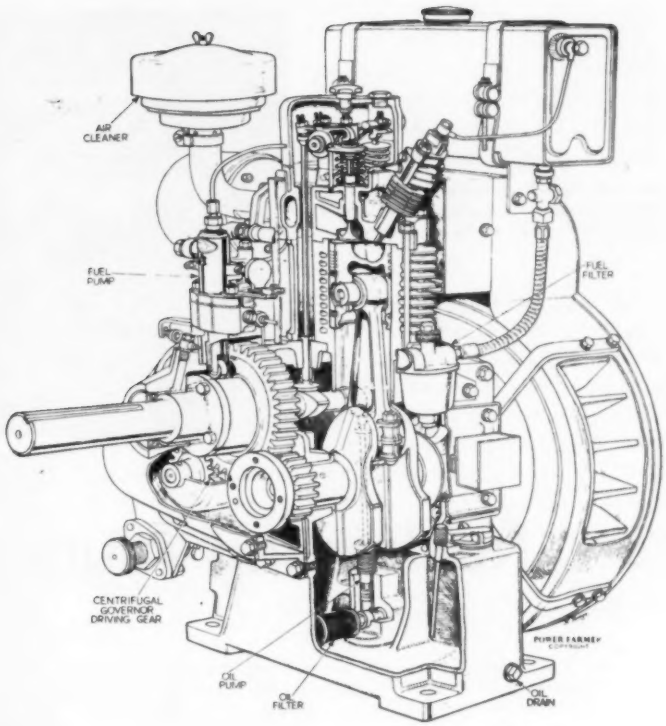
Type-D clutch is adapted to "on-off" service and where maximum torque is required in minimum size.

Automotive cooling fan thermostatically controlled by Type-D magnetic clutch.



Type-D clutch applied as a compressor drive for automotive air conditioning.

Petter's "Lightweight"



Workings of the PAZ1 can be seen clearly in the drawing. Note the hemispherical combustion chamber in the piston crown.

AVAILABILITY of the Model PAZ1 has recently been announced by the Petter Diesel Engine Division of Brush ABOE, Inc. The PAZ1 is a single-cylinder, 4-cycle, air-cooled diesel which develops 2½ hp at 1500 rpm. It has a 3-in bore and stroke and a bmep of 62 psi. Maximum piston speed is 750 fpm. Dry weight of the unit is 260 lb.

This is a wet-sump engine having a cast iron crankcase. The crankshaft is carried in two steel-backed, white-metal lined bearings. These are of the thin shell, precision type. One bearing is pressed into the crankcase at the gear end of the engine, while the other is carried in a cast iron bearing housing bolted to the crankcase at the flywheel end. Crankshaft thrust is taken by the flanged main bearings.

The connecting rod is an "H" section steel stamping. At its lower end, precision-type bearings are used, while at the piston pin end a steel-backed lead-bronze bushing is employed. The top half of the connecting rod bearing is lined with copper-lead, and the lower half is white-metal lined.

A full-floating piston pin carries the 5-ring aluminum alloy piston. The five piston rings consist of three compression and two oil rings. The second oil ring is located below the piston pin. A chrome plated compression ring, designed to decrease wear, has been used in the top groove. The combustion chamber incidentally, is formed by an offset hemispherical bowl in the piston crown.

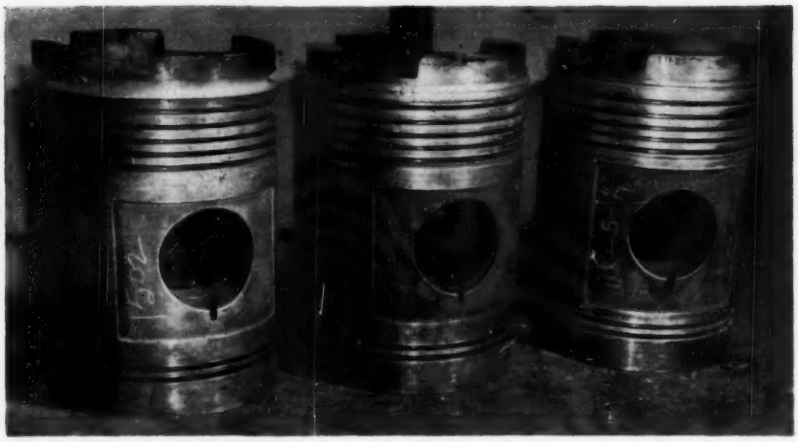
The cylinder and cylinder head, which are through-bolted to the crankcase, are cast iron. These are finned to permit good heat dissipation. The through-bolt design has been used to provide ease of maintenance.

Lubrication is provided by a plunger pump actuated by an eccentric on the camshaft. The pump supplies oil under pressure to the main bearings and rocker gear through a full-flow filter. The cylinder bore and camshaft are splash-lubricated.

Fuel is gravity-fed from a 1-gal tank to the Bryce fuel pump which is mounted on the timing gear cover. The fuel pump is operated directly from the engine camshaft. Timing adjustments are made by shimming the fuel injection pump. A filter is also incorporated in the fuel system. The centrifugal governor is totally enclosed in the timing gear cover. However, the engine speed can be varied over a small range.

Air cooling is effected by a combined flywheel-fan which forces air over the finned cylinder and head. A sheet metal cowling is used to direct the air flow.

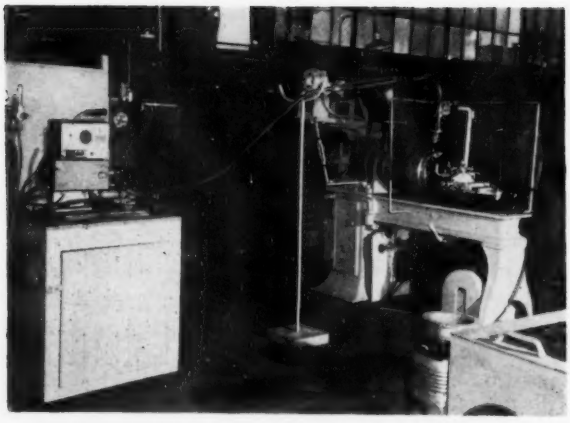
Power may be taken from the crankshaft at either the flywheel or gear end of the engine. Also, a drive can be taken from a shaft extension at half engine speed. A multi-plate industrial clutch can be fitted on either the full- or half-speed shaft at the gear end of the engine.



Left piston shows top ring groove machined for welding. Center piston, groove filled with weld metal. Right piston shows remachined groove.

Reclaiming Aluminum Pistons

Chicago and North Western Railroad is reducing maintenance costs by reclaiming aluminum pistons with the sigma process.



Complete sigma setup for rebuilding aluminum pistons. Machine at left controls consumable electrode rod feed and argon flow. Old lathe was reclaimed and converted for this specific service.

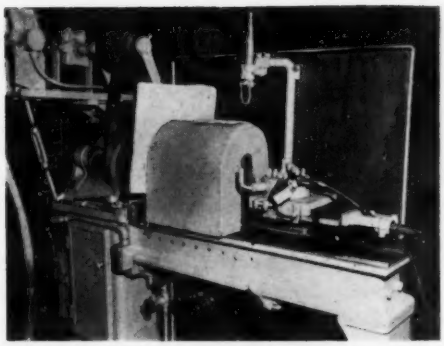
Pictures and text supplied by the Oxweld Railroad Service Company, Chicago, Ill.

ALUMINUM pistons are being reclaimed at the Clinton, Iowa shops of the Chicago and North Western Railroad. The method in use is a welding process known as sigma. This is a short term for the "Shielded Inert Gas Metal Arc" welding process. The inert gas in this case is argon.

In actual operation, a thin wire electrode is automatically fed at the desired rate through the sigma torch to the work. As will be noted in the accompanying illustrations, the torch may be mounted in a bracket or used by hand. When mounted and the rate of feed set, welding becomes automatic and large amounts of weld metal are deposited at high speed.

The result is a smooth, dense, non-porous bead that requires no further working before machining. Since the weld area is protected from the air by a shield of argon gas during welding, no flux is required and hence, no flux entrapment is possible.

To meet its requirements, the C & NW salvaged a 50-year-old lathe from the scrap pile and converted it into a sigma welding setup that can be used for rebuilding piston ring grooves and crowns in addition to repairing cracks. A Heliarc Model HW-11 torch is used for all three operations.

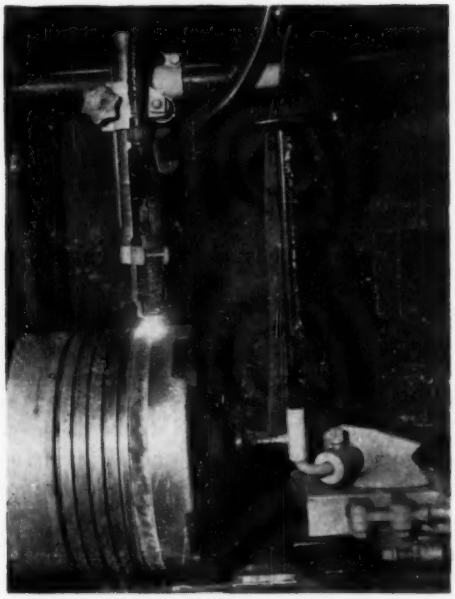


Preheating hood in place over piston. Preheat control valves are seen below the lathe bed.

Ring grooves are rebuilt with the piston in a horizontal position and the sigma torch in a simple bayonette-type fixture directly above the work. After preheating by built-in heating heads, the arc is struck and the build-up proceeds automatically. Because the welding wire feed and piston rotation are automatically controlled at constant rates, a smooth even weld bead is obtained that is easy to machine. Each groove receives three or four overlapping passes at a speed of 1 fpm. In this manner, a groove is rebuilt in about 14 minutes.

Piston crowns are rebuilt on the same machine with a change in the setup which allows the piston to be placed in a vertical position and rotated under the torch. At each revolution, the torch is racked in or out to produce concentric overlapping weld beads until the entire surface is rebuilt. Cracks are repaired by lifting the sigma torch from the holder and using it manually.

According to the C & NW, this inexpensive but efficient setup is used to reclaim hundreds of aluminum pistons at a cost of about $15 each, representing a substantial saving for the road.



Welding is performed with 360-amp, DC, reverse polarity using a 3/32-in aluminum rod and argon flow of 20 cfh. Peripheral speed is 11½-in per min so groove is rebuilt in about 14 minutes.

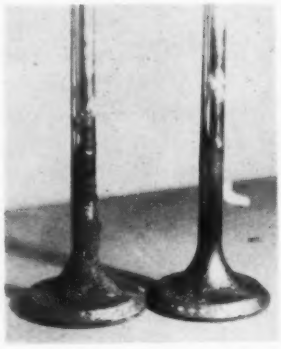
Piston cracks may also be repaired by manually operating sigma torch. Operator triggers wire feed and argon flow.

Piston crowns are also rebuilt. Piston turns on circular plate riding on roller bearings. Vertical plate mounted in place of the lathe chuck bears on the piston plate, thereby turning it.

Engine Valve Difficulties

with Bunker C Fuel

By Robert Dodd,
Chief Engineer
Clay Electric
Cooperative, Inc.



Two exhaust valves from one head. Slag formed in 330 hr. Slag-free fuel did not remove it in 957 hr. Note slag spots on face and build-up on stem.

Here is a third in a series of articles in which the author has outlined his operating experiences with Bunker C fuels. The first, appearing in April 1953, detailed the evolution of a satisfactory system for fuel preparation and introduction of it into the engine. Next, in August 1953, Mr. Dodd told of lube oil contamination problems involved in the use of this high carbon fuel, the deposit problem created, and how he minimized the bad effects. Here is another phase of the overall problem—fused deposits on engine valves. Mr. Dodd tells what he was able to track down by way of causes and how he learned to "live" with the problem. Again we point out that in burning heavy fuels there are so many variables—fuels, engine designs, load conditions, etc.—that there is no typical case. The conditions encountered may or may not apply to another installation but are an extremely important contribution as a guide.—Editor

IN all our experiences with burning Bunker C fuel in our 4-cycle Cooper-Bessemer engines, there has been a notable lack of mechanical difficulties, except those that could be traced directly to the fuel. In fact, we have had definitely less trouble with the parts of the fuel system since changing to Bunker C. It seems that Cooper-Bessemer's controlled-pressure fuel system likes the heavy oil better than the lighter distillates.

It has been possible to keep cylinder and ring wear to what it was with distillate fuels by very close attention to the condition of the lube oil and careful preparation of the fuel. This was discussed in earlier articles. Ring sticking, oil ring plugging, in fact, the whole matter of deposits is now under control. With one exception, no other mechanical difficulties were met in the fuel change.

This exception concerns the exhaust valves and seats. While the results are mechanical failures, the cause is attributable to the fuel. Deposits of a fused material have appeared on the faces of the valves and on the seats. Only the exhaust valves are affected, probably due to their high operating temperatures. Where the material is stuck on the metal, no damage occurs. It's when there are breaks in the material or patches that wire-drawing of the hot gases seriously erodes the metal. The whole thing is somewhat similar in action to the lead deposits on gasoline engine exhaust valves, but very accentuated.

We think that the cause of these fused deposits lies in dissolved impurities in the Bunker C fuel. This trouble is not due to the superior heating value of the heavy fuel since less of it is burned to obtain the same power output. There is no possibility that the material comes from the lube oil since we are using a straight mineral type. Also, we have ruled out the idea that the material is suspended in the fuel.

In preparing the fuel we are using centrifuges which have the highest constant efficiency and are backing them up with both filters and strainers of very fine mesh. These precautions have thoroughly protected the fuel systems of the engine from wear. But the best of centrifuges, filters and strainers cannot touch any material that is dissolved in the fuel and so protect the exhaust valves.

No doubt a great deal of work would be required to develop a treatment to remove this dissolved material or render it harmless in any Bunker C fuel. That work will cost money. Such money will not be spent unless economically justifiable, which would probably mean higher fuel prices. A long list of elements can be found dissolved in residual fuels. Only experience with these impurities can indicate what should be done to the oil and only observation of the engine can point the way to increase the engine's resistance to the damage that the impurities can do.

Sulfur Content a Possible Indicator

The material dissolved in a residual fuel comes from the source of the oil. It is very important to find a supply of oil that the engine will tolerate and to use it exclusively. It will be shown later that the operating conditions of the engine must be held constant in the range in which that particular fuel is suitable.

Sufficient investigation has not yet been made to find how far the total quantity of, and the nature of, the impurities determine how successfully a Bunker C fuel can be used in place of the regular distillate fuel. Bunker C

from the Mexican Petroleum Corporation's own refinery (our supply source) has been found very much less harmful than a Bunker C we received when their own oil was not available.

Customarily, the sulfur content is given in the description of a Bunker C fuel. It appears likely that the sulfur content can be taken as an indication of the amount of harmful impurities present in the fuel. Remember that the customary analysis is only a description of a residual fuel. It tells its viscosity and gravity. Neither of these properties have made any difference over a wide range of variation in our system for handling Bunker C fuel. The description also gives the maximum amount of dirt and water that the centrifuge must remove. So far, our experience has been that the maximum content is rarely present, but when present is no problem at all with good centrifuges of the proper dirt-holding capacity.

The Mexican Petroleum fuel was chosen because of its low sulfur content. When the choice was made, nothing was known of this fused material or as we call it, "slag". (We'll use this term in the rest of this article.) The choice of the low sulfur fuel was a lucky one as it now seems to us that the sulfur content may be a gauge of the amount of the fusible material in the fuel.

The following discussion shows how the slag problem presented itself, and what we are doing to live with it.

Operating Experience

Until the spring of 1953, only the low sulfur Mexican Petroleum Bunker C was burned in the Clay Electric's diesels. No valve trouble was encountered while more than one and a half million gallons were burned, giving a saving of $79,926. While this success was being made at Keystone Heights, in a neighboring plant a slightly higher sulfur content Bunker C was burned in a Cooper-Bessemer diesel of the same model and size. That engine pulled its load nicely and produced more kw hr per gal than with regular distillate fuel. But its operation could not be called a success because of the persistent valve trouble caused by the fuel.

Then in the spring of 1953, the Mexican Petroleum Bunker C was not available and the Clay Electric received 21,000 gal of a Bunker C with a slightly higher sulfur content. The storage tank was nearly empty and the 21,000 gal were not appreciably mixed with the remaining Mexican Petroleum fuel. In a three-day run on that higher sulfur fuel, the Clay Electric had the same valve trouble encountered in the neighboring plant.

The nature of the slag deposits is illustrated. One picture shows the damage the dissolved material can do. The damage progresses rapidly. It is the same type of failure as is caused by the tappet holding the valve open. The slag builds up in patches on the face of the valve and in registering patches on the seat. The tappet clearance increases proportionate to the thickness of the slag and the valve begins to burn between the patches. The fused material itself does not damage the metal either of the valve or of the seat. But wire-drawing of the escaping gases between the patches of slag occurs. High temperature errosion blasts deep channels through the valve face and seat.

Nature of Ash Held Important

The accompanying analyses are of the ash from Bunker C samples. Columns 2 and 3 are the reports on samples taken from the neighboring plant in April and May of 1953. Column 4 is the analysis of the ash from a sample of Mexican Petroleum Bunker C taken in Keystone Heights in May 1953.

The metallic content of the Mexican Petroleum Bunker C is low. At different times the total ash content has been given as 0.05 and 0.12 per cent. The last figure is more than twice as much as the other fuel which produced slag on the valves. This shows that the nature of the ash is important.

In the spring of 1953, it seemed that the trouble with the valves could be blamed squarely on the source of the Bunker C fuel. The thought was that something in the oil caused the trouble and that it was absent from what we called "good" oil. This overlooked the analysis which shows almost every metal present in the good oil as in the bad oil, though in lesser quantity.

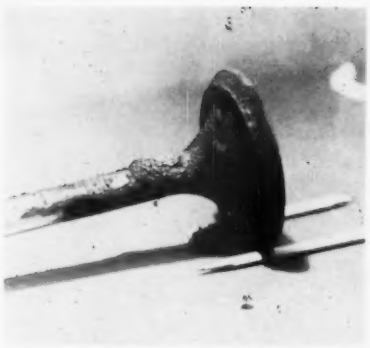
As soon as the 21,000 gal of the higher sulfur fuel was found to be producing slag, all further deliveries were stopped. When the Mexican Petroleum Bunker C became available, the tank was filled. No more valve trouble occurred while over 200,000 gal of this fuel was burned.

Operating Conditions a Factor

During the summer of 1953, there were three occasions when exhaust valves burned out. These were not clear-cut cases of slag—there were only minor deposits on the valve which leaked. Only one valve went bad on each

ANALYSIS OF ASH FROM TWO TYPES OF BUNKER C FUEL USED

Columns:— 1	2 Gainesville April	3 Gainesville May	4 Keystone May
Vanadium	35.5 %	40.0 %	7.0 %
Magnesium	17.5	2.0	.40
Copper	12.5	.10	.005
Iron	7.5	3.8	1.5
Silicon	10.0	7.5	1.0
Aluminum	2.5	2.5	.25
Sodium	2.5	2.0	.25
Nickel	2.5	2.5	.25
Calcium	1.5	2.0	.75
Manganese	.25	.10	.025
Strontium	.1	.1	.025
Lead	.05	.015	.005
Tin	.05	.....	.....
Titanium	.05	.....	.....
Chromium	.05	.005	.005
Barium	.05	.....	.....
Cobalt	.025	.005	.005
Zinc	.01	.....	.....
Boron	.005	.....	.....



Slag build-up on this valve occurred while the engine was operating with a clear exhaust. This build-up is not like the deposit often found on intake valves.

A discarded valve. Whiteness is due to minerals brought out of slag by moisture in the air.

Here, patches of slag can be seen on valve face. Note how slag ran towards stem like treacle

of the three occasions during the summer, while in the spring, with the bad fuel, all the exhaust valves in three engines were affected. A quarter of them were a total loss and half had to be rebuilt with stellite faces. The rest were refaced, heavy grinding being needed, and were used again.

In the fall of 1953, arrangements were made in the neighboring plant to burn the same Mexican Petroleum Bunker C in their diesel as we were using so successfully. Separate fuel tanks with separate fuel pumps and pipes were provided. There was no possible mixture with the other Bunker C known to produce slag that was still being used in the steam part of their plant.

Their engine proved that the source of the Bunker C does not guarantee successful use in diesel engines. The supposedly good fuel produced slag on the exhaust valves as had the other fuel. Perhaps the trouble did not occur as quickly as with the other fuel, but it was far too severe to be ignored. Since then all attempts to burn Bunker C have been suspended until there is labor for the excessive maintenance the valve trouble entails.

A few days after the last failure in the neighbor plant, another valve burned in our Keystone plant. That time there was no doubt about the cause of failure—slag. Only one of the two exhaust valves in the head burned, but the other valve had the deposit too. The other seven heads of the engine showed no trouble. A thorough check was made at once of the possibility of the fuel having come from some other source. No substitution could have occurred. So the fuel which had given good service could definitely produce slag under some conditions.

In the neighboring plant, the engine had been operated steadily at 90 per cent load when the slag occurred from the Mexican Petroleum fuel. The Clay Electric's engines had been operated at varying loads, frequently down to half and only for short times at full load. The four-valve failures had all occurred in the lead engine which had most frequently pulled full load. Differences in load balance can explain why the slag was only in one cylinder.

As a working hypothesis, we say there is a rate of deposit and a rate of wearing off for the slag. By limiting the time of maximum input of impurities, that is by limiting the time full load is pulled and holding the average load to 70 per cent, we have been able to operate 5000 hr between valve overhauls on Bunker C, just as we did when using light fuel.

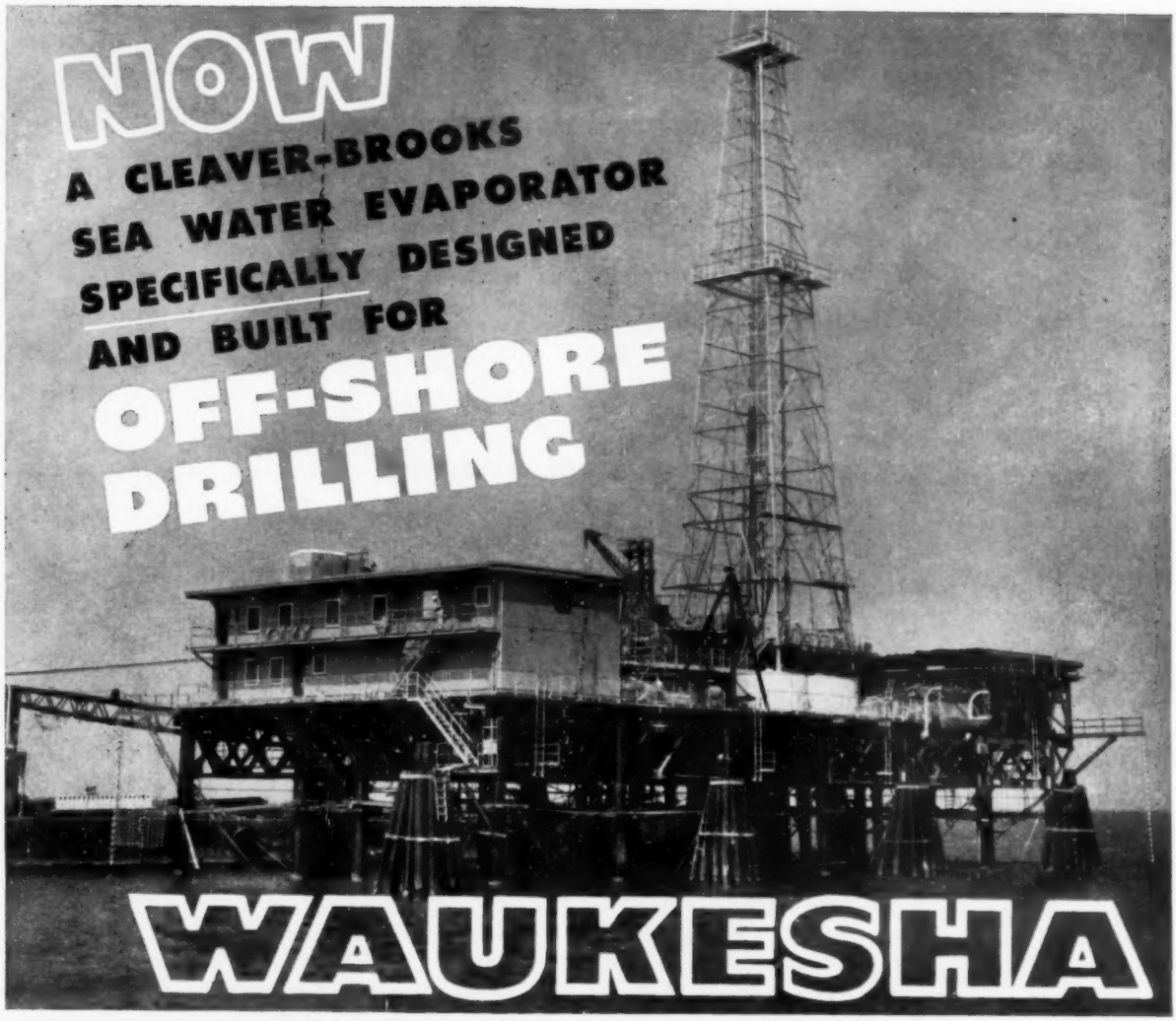
On this assumption, the change of fuel in the spring of 1953 made trouble because the impurities in that fuel were deposited on the valves faster than they were wearing off under the same loads as had been carried successfully on Mexican Petroleum fuel. We have hopes that rotating the exhaust valves will increase the wear-off rate. The trials we have made with rotation show promise. It may be that rotation will increase the wear-off rate sufficiently to balance the deposit rate of any Bunker C fuel even at full loads.

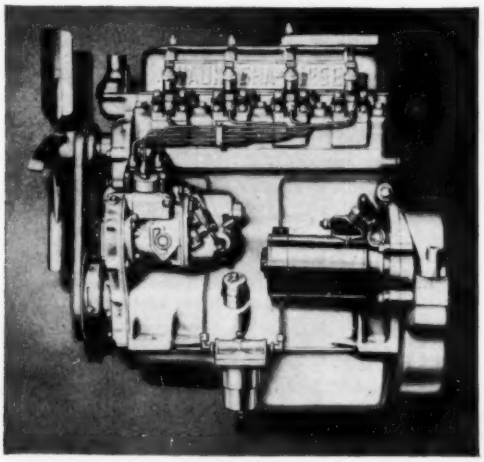
Blending with ash-free light fuel will lower the deposit rate of any fuel. This would explain why there had been no slag trouble in the 4-cycle diesels in the Tarboro, N. C. plant where blended Bunker C from Aruba is used. (South American residual fuels are said to be high in impurities.)

Results

We have lessened the expense of the slag trouble by having the damaged valves rebuilt with stellite in a local machine shop. Since previously on light fuel we occasionally lost an exhaust valve, there has been only a moderate increase in cost for valve maintenance.

This increased cost is offset by a reduction of maintenance in the engines' bearings because of the superior filtering necessary for heavy fuel operation. Our two plants together are making a gross saving of $8000 per month. Almost all of this is net as the only noticeable increase due to heavy fuel is in the lube oil cost because of the extra filter changes and the extensive reclaiming.





WAUKESHA 180-DLC DIESEL powering evaporator shown is a 4-cylinder, 4-cycle engine, 3½-in. x 3¾-in., 144 cu. in. displ., maximum hp 45 at 2400 rpm. It's a smooth, clean Diesel with lively pick-up and quick response, shock-free operation and high fuel economy. *Send for Bulletin 1626.*

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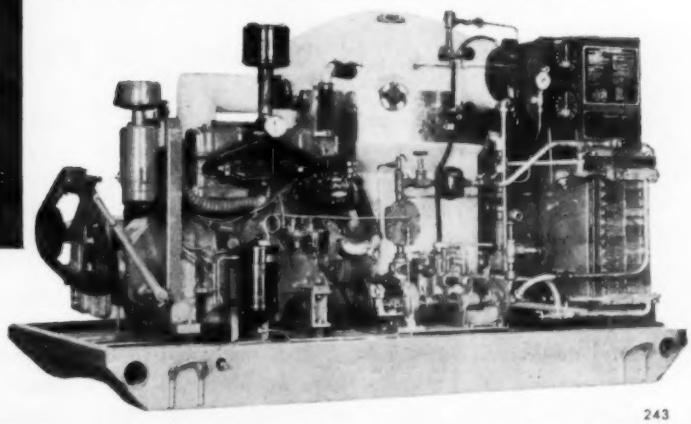

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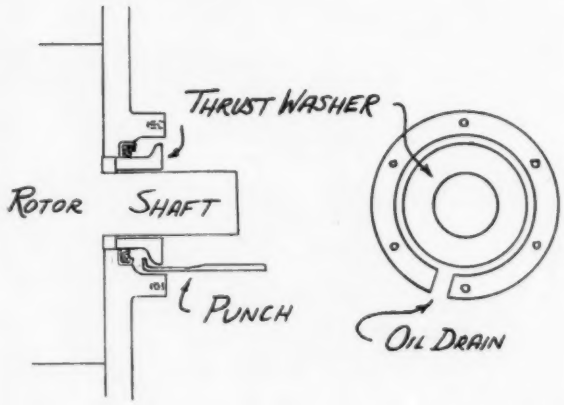
Straight from the Tool Box

This is YOUR Department. Pass along your ideas to the other fellow. Send items to the Editor, preferably with a picture or sketch. Contributors will receive $10.00 for each item upon publication.

Blower Seal Shortcut

DONALD C. BEDDIE, SPILLIMACHEEN, B.C.—Perhaps some of your readers will benefit from this little item concerning the installation of front-end blower seals on General Motors 268A engines. The mean part about the job is to get the thrust washer in place through the seal without damaging the seal leather.

We discovered that they could be put on easily and without damage by putting the seal on the washer first and then putting the two on the shaft together as an assembly. The problem, of course, is to seat the seal properly in the counterbore. To do this, we made a bent punch with a wide flat end. The shank is made thin enough so that the punch can be moved all the way around between the housing and the washer flange. It is inserted at the oil drain groove in the housing. We could then tap the seal into place easily while crowding the washer into position at the same time. With care, the broad flat end of the punch makes it possible to seat the seal without any damage to it. The leather, already bearing on the thrust washer, cannot be harmed.



Glad that you mentioned the care necessary in the use of the punch. By spreading the driving force over the largest possible area, the chance of bending or denting the seal is reduced. These seals are important. We once had an engine "run away" as the result of a seal cut during installation. The lube oil pumped through the seal into the blower and from there to the cylinders. With uncontrolled amounts of fuel (it ran well on lube oil), the engine ran away and had to be stopped by blocking the air intake. Since then, we are sympathetic to ideas for keeping seals in good shape—Editor.

Hydraulics for Pulling Bearings

FLOYD BORMAN, ENTERPRISE, OREGON—Sometimes it is necessary to pull the pilot bearing in the end of the crankshaft or in a flywheel counterbore. That's when there is no proper puller available. We recently had one in a D4600 Cat engine that had run hot and was pretty well frozen into place.

All we had to work with was a makeshift puller, and it wouldn't move it. We got it out though, without damage to the bore. First, we got a shaft that fitted in the inner bearing race, closely. Then, we filled the cavity behind the bearing with wheel bearing grease, being careful to get all the air out. Any air left in the cavity will later compress and produce a spring action.

The next step is to place the shaft in the bearing race and give it a good hard lick with a heavy hammer. We pulled this bearing with three fillings of grease, a 12-lb hammer, and the crank extension of a D8 Cat. The big end of the extension is a good snug fit for this pilot bearing. Hope this helps someone.

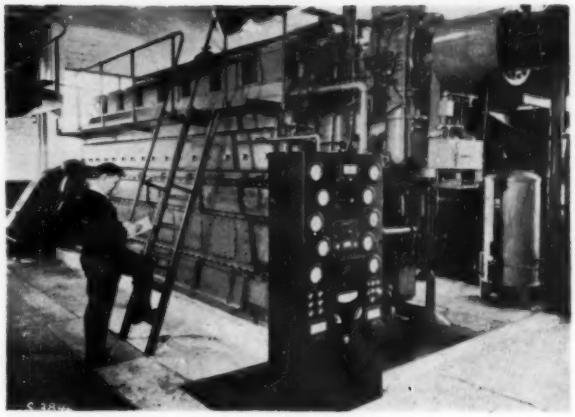
Reminds us of a story about an American company getting a foreign letter asking for details on a "liquid male sheep". They finally figured it out to mean a hydraulic ram. That's what you have here—Editor.

news of our industry

Le Sueur, Minnesota Reports Profits

Latest addition to the Le Sueur municipal power plant was a Worthington Type SEHGO-8, supercharged dual-fuel diesel-electric unit rated at 1300 kw. It went into service during the first quarter of 1953 and according to some recent reports by Superintendent Merle D. Geving, has cut fuel costs some 27.8 per cent.

For the 9-month period from the end of their fiscal year, March 31st, 1953 to the end of the calendar year, December 31st, 1953, the Worthington unit reportedly generated 73.1 per cent of the total output which was 4,383,450 kw hr. For this period, fuel costs averaged 5.2 mils compared to 7.2 for the preceding period—a saving of $9766.90.



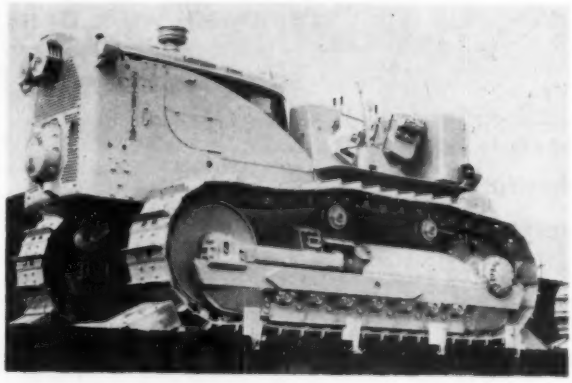
An Expected Arrival

Recently announced by the Caterpillar Tractor Company was the sixth member of the company's crawler tractor family. The D9X as it is called, represents the culmination of five years of research and development on the part of Caterpillar. Further, it is another step in the eternal race for more horsepower which has been with us since the days of the steam traction engine and even before when more and more horses were added to large machines to provide more power for increased production.

Now, we see the D9X's, one of which has been placed in service on a Washington logging operation as part of the extensive tests the D9X's will undergo before they are placed in the production line. In addition to the unit employed in logging operations, several other of the powerful crawlers will be assembled and assigned at 3- to 4-week intervals to carefully selected jobs in earth-moving, pipeline clearing, stripmining, spoil bank handling and other heavy-duty applications, according to Gail E. Spain, vice president.

While in the field, the machines will be observed closely by field engineers and product application personnel of the company. At the conclusion of the tests, units will be returned to the factory and final design of production models revised as necessary to include suggestions and observations from the companies cooperating in the program.

Tentative specifications on the D9X list the machine as 18-ft long, 12-ft wide, and 10-ft high, with the bare tractor weighing in around 51,500 lb. Blade and cable control add an additional 11,000 lb. Horsepower was not given.



new products . . . . . page 104

new literature . . . . . page 108

organizational news . . . . . page 110

Real Diesel Fuel ECONOMY

Residual oils are an efficient, low cost fuel for diesel engines . . . especially when unburnable particles are continuously removed with a high efficiency **Sharples Residual Fuel Purifier.**

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news of our industry

OGP Conference Is Success

Kansas City, and particularly the Kansas City Section, Region VIII, of the American Society of Mechanical Engineers, played host recently to the 26th Annual Conference and Exhibit of the society's Oil and Gas Power Div. Attendance figures set a new high for this activity, so important to the diesel industry—registration alone topped 500. Engine builders, accessory and equipment manufacturers, pipeliners, power plant operators, and consulting engineers were among key people in evidence.

Oil and gas engines in pipeline and power plant service was the central theme of the technical papers, panel discussions, and inspection trips.

In conjunction with the technical program, the Diesel Engine Mfrs. Assn. conducted two events—a meeting for power plant operators and educators and one for its chief engineers. In addition, Harvey T. Hill, DEMA director, officiated as toastmaster at a banquet during which he introduced L. K. Sillcox, president of ASME, who talked on the subject, "Diesels Did It."

As part of the ceremony, OGP awards were presented to a number of authors for their technical contributions during the previous year. Certificates of promotion to the Fellow grade of ASME membership were given to Lee Schneitter, Ebasco Services, Inc., and George Dashefsky, New York Naval Material Laboratory. Mr. Dashefsky is the retiring OGP chairman and is succeeded by John Worthington, Koppers Co., Inc.

By special arrangement with the Gas Turbine Power Div., both Solar and Boeing gas turbines were on exhibit. This tied in with a co sponsored session dealing with the use of gas turbines in pipeline service.

Proceedings of this meeting will be available later in the year. Since it included discussions at the operating level as well as presentation of highly technical developments, the varied program is of broad interest.

news of our industry

I-H Increases TD-24 HP Rating

The Industrial Power Div. of International Harvester Co. has announced an increase in horsepower rating for the TD-24, largest crawler tractor in its line of earthmoving equipment. Present production model of the TD-24 is 190 engine hp and 155 drawbar hp. Maximum drawbar pull is 40,000 lb and operating weight of the new model is 42,884 lb.

Power plant for the tractor is the I-H D-1091 diesel, 5¾-in bore by 7-in stroke, with a rated governed speed of 1400 rpm and inbuilt gasoline conversion starting. The increased-power model is designed to work with scrapers up to 27½-cu yd capacity; angle blade dozers up to 14½ ft and straight blade dozers up to 12¼ ft.

CNR Orders Two More Budds

The Canadian National Railways has ordered two more self-propelled rail diesel cars from The Budd Co., following by less than a year the road's inauguration of this equipment in New Brunswick.

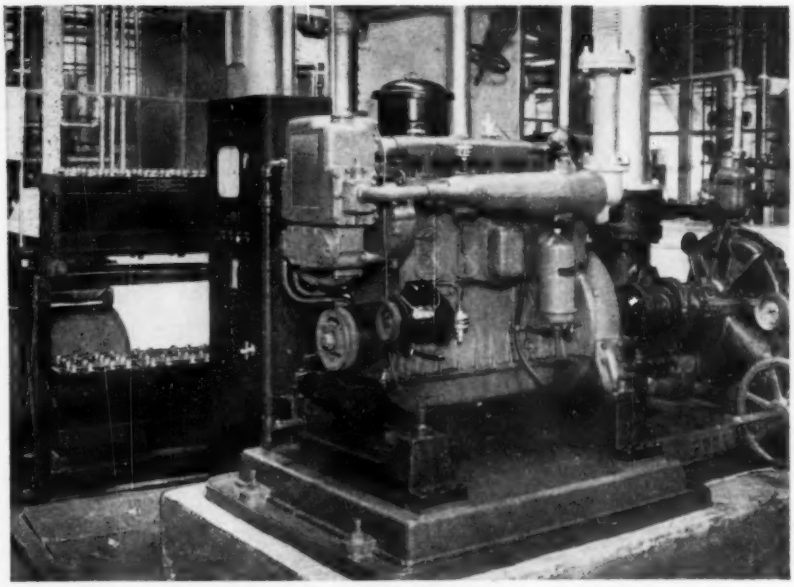
After delivery this summer, it is expected that the new RDC's will be operated as a twin unit in daily service between the two cities of Levis and Riviere du Loup. One car, the RDC-1, seats 89 passengers. The other, an RDC-4, has all of its interior space divided between baggage and mail compartments.

Swedish Diesel On Market Here

American Bolinder-Munktell Co., American branch of Sweden's Bolinder-Munktell, announces establishment of facilities for factory distribution of the recently developed Series 105 heavy-duty diesel engines.

The new series comprises 1-, 2-, 3-, and 4-cyl engines—designated 1051 to 1054—developing 11, 22, 33, and 44 bhp at 1500 rpm. The 4-cycle direct injection engines are in production in 30 different standard versions and are available in 120 different models for different classes of power needs.

(NEWS . . . Continues on Page 112)



They watch together. The Nicad battery (*left*) will provide this Diesel engine with a surge of starting power on a split-second's notice in case of alarm.

Fire warden all ready to jump

It may be 5 minutes from now or never when this battery is called into action. But because it is a Nicad it will spring into service the split-second the fire signal is given. It will start this Diesel fire pump for emergency water supply.

The Nicad battery has the exact characteristics such trigger-action service requires. It will stand by for years without deterioration, it accepts a trickle charge and it is easy to maintain. The nickel cadmium battery has long been preferred in Europe for services vital to life and property, and was first made in America by Nicad.

Nicad batteries and Diesel engines pair perfectly. Nicad offers lowest over-all costs. Data available.

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Function.....

Company.....

No. and St.....

City.....Zone.....State.....

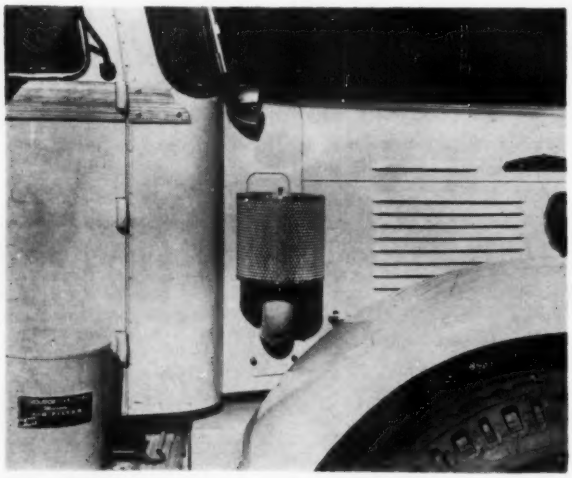
new products

Hand Tachometer

A new portable hand tachometer featuring a scale-changing device designed to reduce misreading of its various ranges, has been announced by the General Electric Company's Meter and Instrument Department.

Three different models, each having three ranges, are capable of measuring rotational speeds from 2 to 100,000 rpm and linear speeds from 2 to 10,000 fpm with accessories, according to the manufacturer. Accuracy is said to be plus or minus one per cent of full scale under all conditions.

The equipment includes two basic units: a head which is placed against the moving object, and an indicator which is attached by a 2-ft flexible electric cable. Total weight of the equipment is 3 3/4 lb including the carrying case, which measures 11 7/16 in by 7 5/16 in by 3 3/4 in.



Torque Converters

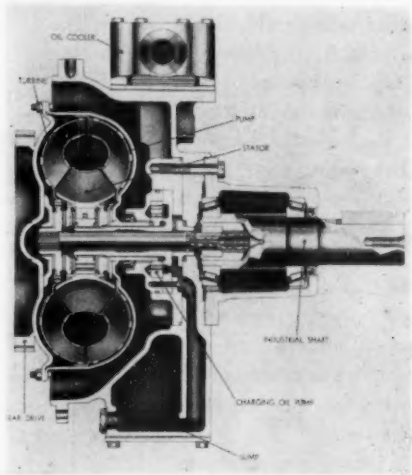
Torque converters designed to meet the requirements of heavy-duty operation are now available for application in the lower power ranges through the development of a new series of Allison Torqmatic drives. The new converters, designated as the TC-200 and TC-300 series, can be used with either gasoline or diesel engines in the 40- to 150-hp range.

Addition of the new series enables coverage of the 40- to 400-hp range with Torqmatic drives for both gasoline and diesel engines, according to the announcement. The unit is designed for simplified flexible installation because integral with the converter are the oil system, charging oil pump, oil cooler, oil sump, and gear drive. Installation can be made on any SAE standard power take-off flywheel.

Dry Type Filter

A new dry-type micronic air filter for both gasoline and diesel engines has been introduced by Purolator Products, Inc., Rahway, N. J. Similar in construction to the present Purolator micronic automotive filter for lubricating systems, the new filter is said to have many advantages over the standard type of air filter presently in use. Chief among these advantages are a higher degree of filtration, thereby reducing the entrance of air-borne abrasives into an engine; a freer flow of air into the combustion chambers; and since it is easier and cleaner to service, a greatly reduced serviceability time.

Purolator engineers have run extensive tests on this new product over the past two years with the cooperation of fleet owners from all parts of the country.



Jib Cranes

Among the several new product lines recently announced by R. G. LeTourneau, Inc., of Longview, Texas, are jib cranes of 6- and 15-ton capacities. The cranes are self-supporting units of the pillar type and are designed for various applications, either indoors or outdoors, where heavy parts must be handled.

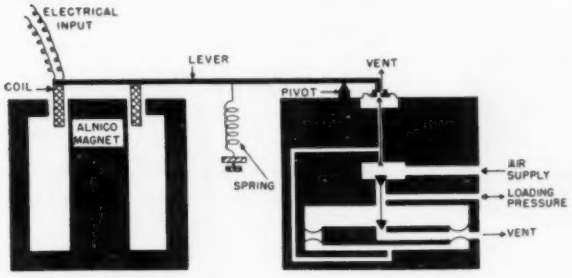
The span of the cranes is 25 ft, permitting an area of 1936 sq ft to be served. The 14½-ft vertical clearance of the jib is designed to provide adequate room for the handling of bulky or tall objects.

Featured in the cranes is continuous 360-deg pivoting in either direction. To provide ease of operation while under load, a roller bearing ring, ball joint and ball thrust socket have been built into the top of the support pillar.

Power Relay

A new power relay designed to eliminate transmission lags common to pneumatic systems has been announced by The Swartwout Company, 18511 Euclid Avenue, Cleveland 12, Ohio. The unit is described as the Autronic Type P2R power relay, an electro-pneumatic transducer. It takes the electrical output from the Autronic controller or manual control and converts it to an air-loading pressure proportional to the electric current. No electric motors, boosters or slide wires are employed and the equipment can be made explosion-proof if desired.

Process variables are converted into a small AC volt-



age by the primary element transmitter and acted upon by a selective range of control actions in the Autronic controller. DC output of the controller, which is transmitted to the power relay, is fundamentally governed by the primary element transmitter, but is continually modulated by the proportional, reset and rate-time actions of the controller. Large mechanical power amplification at the final control element is obtained by the P2R relay, according to the announcement.

The relay operates on the null-balance principle in which a magnetic force is balanced against the force produced by the air-output pressure from the pneumatic pilot. The electrical side of the relay consists of a moving coil in a permanent-magnet field and is adjusted so that a 4 milliampere current gives an air loading pressure of 3 psi, and an 8 milliampere current produces a 15 psi output with a direct-acting power relay. Other higher air-pressure ranges are available and the unit can be used as either reverse- or direct-acting.

CATERPILLAR TRACTOR CO. SELECTS
DETROIT ENGINE THERMOSTATS
for the
big earthmovers!

Rugged, reliable, world renowned . . . that pretty well describes the familiar yellow Cat-built Machines. It's an apt description of Detroit Vernatherm Engine Thermostats, too. That's why Caterpillar Tractor Co., this year celebrating "50 Years On Tracks," specifies Detroit as standard equipment.

Detroit Vernatherm thermostats assure the accurate control of engine temperature necessary to maximum engine efficiency. These thermostats were pioneered by Detroit Controls Corporation to meet the requirements of modern pressurized cooling systems. Vernatherm engine thermostats will stay tightly closed against high pump pressures. Long, trouble-free service is provided by the specially developed temperature responsive compound used in Vernatherm thermostats to give powerful thermostat operation.

So take advantage of this advanced design and superior operation. If you're concerned with modern engine cooling and oil cooling systems for Diesel, heavy-duty gasoline or jet engines, Detroit Sales Engineers will welcome the opportunity to consult with you on your thermostat requirements.

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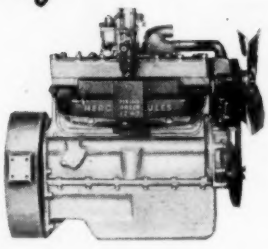
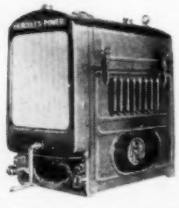
HERCULES

2336 South Garfield Avenue
Los Angeles, California

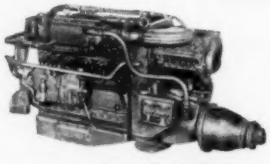
adds New service facilities



The increased demand for Hercules Engines and Power Units has resulted in a nationwide expansion of Hercules sales and service facilities. The above photograph is of the new Los Angeles branch which is the latest addition to the Hercules sales and service stores.



Facilities of this and other factory branches include: a salesroom, complete parts department, offices and a fully equipped machine shop for engine repair and rebuilding. In addition to the branches in the west and southwest, Hercules distributors throughout the country stand ready to provide immediate service in the following fields; automotive, agriculture, construction, industrial, marine and petroleum.



Hercules branches and distributors provide a dependable source for genuine Hercules parts as well as experienced personnel, to provide economical repair and service of Hercules engines and power units.

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INDUSTRIAL MARINE AUTOMOTIVE AGRICULTURAL OIL FIELD CONSTRUCTION

We have over 300 parts depots, service outlets and branches ready to serve you. For the name and address of the Hercules outlet nearest you, write on your letterhead and ask for a copy of "The Hercules Distributor and Dealer List."

Engine Specialists since 1915

HERCULES MOTORS CORPORATION

125 ELEVENTH ST. S. E. CANTON, OHIO, U. S. A.

new products

Electrically Powered Hoist

Unit Mfg. Co., 1229 Harmon Pl., Minneapolis, Minn., is marketing an electrically powered hydraulic hoist which permits one man to lift up to a ton in less than half a minute by simply pressing a button. Loads are said to be lifted twice as fast as manually powered hoists or cranes.

In addition, the hoist is capable of being changed from a mobile shop hoist on 4-wheel truck to a truck bed or loading dock mounting. The hydraulic system is rated at 5000 psi. The unit's 6-v motor is battery-powered. The manufacturer also announces that conversion kits are available for its manually operated hoists.

Connecting Rod Reconditioner

F. A. Wagner & Son, P. O. Box 20, Livermore, Cal., is now providing the Rodmaster with a steel base as standard equipment. Formerly the unit was produced only in bench type.

The device is a compact apparatus for reconditioning the large ends of engine connecting rods—grinding off the surface of rod and cap at parting line and then honing out the bore to original factory standard. Grinding is done on a cup wheel while rod or cap is held in a precision clamp. The maker claims that the small amount of stock removed will not materially affect compression of engines.

The hone has four blades which are adjustable through a range of ½ in. Honing material is an abrasive cloth carried on a spool inside the hone. Three sets of hone blades come with the machine for a range of from 2 in to 3½ in, and a special small hone is available for work on smaller bores. The motor of the machine operates on 110 v AC.

new products

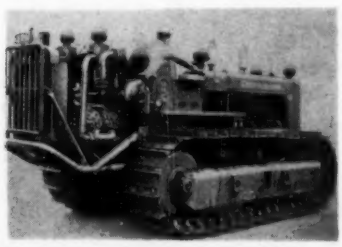
Tractor-Mounted Compressor

Pipeliners and heavy construction contractors will be particularly interested in the new 600 CTM, a tractor-mounted compressor which is being manufactured by Le Roi Co., 1706 S. 68 St., Milwaukee 14, Wis. The unit, with side booms and twin wagon drill air feed assemblies of the Le Roi-Cleveland DR-14 class, is claimed capable of converting retired tractors into fast-moving integral drilling units. The compressor can be readily mounted on any leading make of crawler tractor.

For example, a crawler with weak and worn tracks incapable of producing enough traction for dozing or scraping operations but still having an engine worth saving, can have the 600 CTM mounted on it and relieve a newer crawler of the expensive and slow job of towing a heavier, harder-to-handle 4-wheel portable compressor. Since the same engine powers both tractor and compressor, economies in fuel and maintenance costs are also claimed.

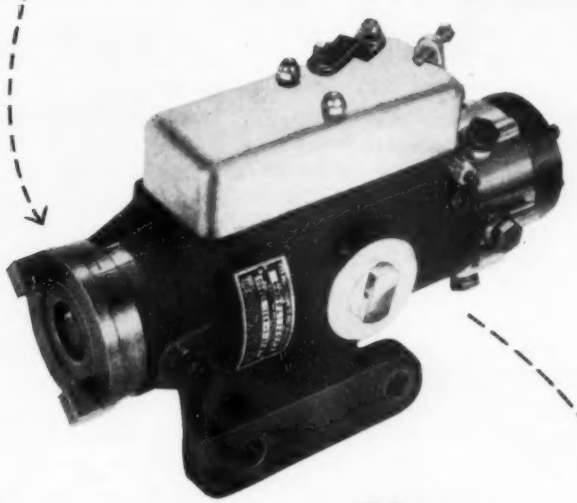
Standard equipment includes an independent clutch to disengage compressor from power take-off shaft; deep crankcase for operation at 30-deg angle; complete compressor controls including slow-down of engine; heavy undercarriage and intercooler guards; air receivers; and heavy-duty oil bath air cleaners.

The compressor is directly connected to rear power take-off shaft of tractor and lined up to the same close tolerances as engine and compressor on a 4-wheel unit. Illustration shows compressor mounted on an International Harvester TD-24 crawler. Compressor adds 5030 lb to total weight of unit.

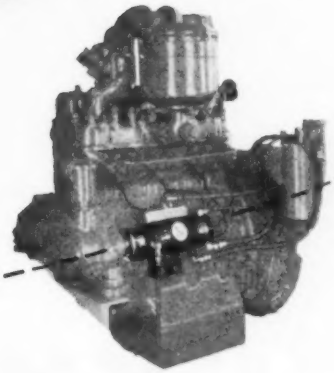


(NEW PRODUCTS . . . Page 120)

this revolutionary pump



makes good diesels better!



Perfected after 15 years of research and intensive field experience, the Roosa Master is a revolutionary development for better and simplified fuel injection. Performance-proven... simple... compact and lightweight, Roosa Master offers to both diesel engine manufacturers and users such advanced features as: built-in governor that gives extremely close speed regulation, built-in transfer pump, complete self-lubrication... plus the elimination of complicated springs, poppet valves, ball bearings and gears. Not limited on high speed applications and easy to service right in the field, Roosa Master pays big dividends (to your diesel customers) in high performance, low maintenance cost, and long life. For the very best in diesel engine performance, specify Roosa Master, made by one of New England's leading manufacturers of precision machined products. Complete information is available from the Hartford Machine Screw Company, Hartford 2, Conn., or your engine manufacturer.

ROOSA MASTER

THE MODERN FUEL INJECTION PUMP

new literature

Alloy Data for Diesel Upkeep

Three engineering data sheets have been released by Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich., giving information on application of the company's nickel-base and iron-base hardfacing and spray welding alloys to diesel engine valves. These are said to provide wear surfaces that resist abrasion. impact, galling, and corrosion.

Typical valve applications are detailed, including procedures, part sketches, equipment requirements, and results. Data sheet No. 1 (1 page) gives a table for estimating material requirements with coverage in sq-in per lb for six alloys as well as pounds needed to overlay a sq ft with different overlay thicknesses.

Data Sheet No. 5 (2 pages) contains a table of grinding wheel specifications listing the models of six manufacturers which are adaptable to OD, ID, and internal grinding of Colmonoy nickel-base and iron-base alloys.

Data Sheet No. 37 (2 pages) concerns the reclaiming of diesel engine valves with No. 5 alloy. Application methods and finishing techniques are included for coating worn valves by the spray welding process with comparative performance data for coated and uncoated valves.

Hob Catalog

Recently published by Brad Foote Gear Works, Inc., 1309 S. Cicero Ave., Cicero 50, Ill., is a new hob list containing listings of over 2000 cutters, broaches and special tools available for making gears, splines, racks, etc. The stock tools make it possible to do most gear cutting without waiting for new tools to be made.

2-Lever Coordination Control

A file of application engineering data on a new 2-lever coordination control for pneumatically-actuated equipment and processes has been published by Pantex Mfg. Corp., P. O. Box 660, Pawtucket, R. I.

Alternate methods of arranging the mechanism so that different types of coordination between the two levers will actuate the unit are described in an 8-page section. Another section is devoted to analyzing uses for various manual and automatic actuation systems. The study also shows how dual units may be connected in series or parallel for safety and remote control purposes. Prices, specifications, capacities, operating forces and mounting data are given.

Temperature Chart

A handy, pocket-sized chart of Fahrenheit and Centrigrade temperature equivalents may be had without obligation from Moeller Instrument Co., Richmond Hill 18, N. Y.

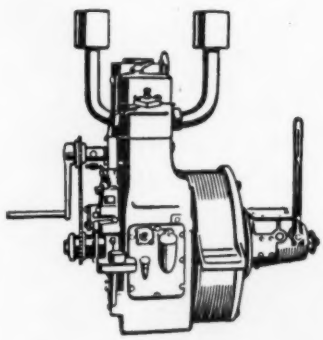
BUKH Diesel

YOU BET YOUR LIFE . . .

on the dependability of your lifeboat power. Recent submersion tests in New York harbor offered demonstrated proof that the BUKH Diesel runs smoothly and efficiently, and develops full power even while completely under water.

BUKH four-stroke cycle lifeboat Diesels are available in three sizes with outputs of 10, 20 and 30 horsepower, at 1500 r.p.m.

There is a BUKH 4-cycle full diesel tailored to suit your requirements for marine or land, stationary or mobile power. Fifty years of diesel experience is behind their outstanding dependability and economy.



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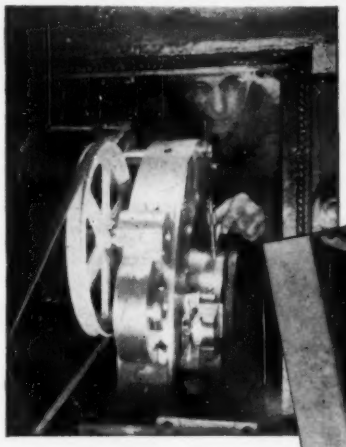


CRANK PINS REFINISHED IN PLACE

For engines of practically any size our Portable Machines are available for quick and economical restoration of damaged crank pins. Let us help you minimize down-time.

Requests for the purchase of these machines have become so numerous we have decided to manufacture them for sale and invite your inquiries.

Above illustrations show views of our Portable Crank Pin Machines at work in various size marine engines. At right a marine engineer checks the accuracy of a refinished crank journal.

Additional information furnished without obligation

WASHINGTON IRON WORKS, INC.
Established 1876
SHERMAN, TEXAS

new literature

AEC Issues Bibliographies

A new series of bibliographies, "Selected AEC Reports of Interest to Industry," has been compiled by the Atomic Energy Commission to help American industry judge its interest in non-secret literature reporting technology developed in the atomic energy program. The new series selects from nearly 9000 unclassified research and development reports about 800 considered of particular interest. This selection is divided into industry categories, published as individual sections.

The entire set or individual sections may be purchased from the Office of Technical Services, Dept. of Commerce, Washington 25, D. C. Cost of set is $2.25. An individual section, such as Mechanics & Mechanical Engineering, is 25c.

In addition, special industry information depositories are being established in various cities. The two programs, bibliographies and depositories, represent the agency's effort to pass on to industry techniques and processes which could contribute to technical progress generally and to broadening participation in development of the new power source for peaceful purposes.

Aluminum Heat Exchanger Tubes

Latest in the technical booklet series of the Aluminum Co. of America, 728 Alcoa Bldg., Pittsburgh 19, Pa., is entitled "Alcoa Aluminum Heat Exchanger Tubes." The 2-color booklet covers types of tubes, explanation of corrosion protection provided by cladding, service and laboratory experience in their use with cooling water, and applications in various industries.

A section on fabrication includes general design data and alloy recommendations. Among the tables and discussions of the technical section are heat transfer, fluid flow, specifications, estimating data, and mechanical characteristics.

Torque Converter Coolers

Young Radiator Co., Racine, Wis., has issued an 8-page, 3-color catalog illustrating its new torque converter cooler line. The coolers are engineered for mobile or stationary application from 100 to 600 hp. They are for oil-to-air or oil-to-water cooling of power equipment, using straight hydraulic or hydraulic and mechanically clutched transmissions.

The catalog covers specifications, cooling capacities, dimensions, and product features. Model illustrations and cutaway views are contained.

Lubricated Plug Valves

A 24-page reference book showing its lubricated plug valves in full-port and venturi types has been issued by Homestead Valve Mfg. Co., Coraopolis, Pa.

The valves come in a choice of self-sealed 2-piece or 1-piece plug designs. Engineering information includes principal dimensions, types of control, metals, lubricants, etc.

(NEW LITERATURE . . . Page 117)

organizational news

National Supply N. Y. Manager

William P. Streeter has been appointed manager of the New York City office of the Engine Div. of The National Supply Co. He succeeds Kjell Harry Nilsson, who has retired.

Mr. Streeter started with the company as a salesman in 1944 and has served as sales engineer since 1950. Mr. Nilsson, who has been associated with the diesel industry since 1922, first joined Atlas Imperial in 1926. He became branch manager shortly after that company's assets were acquired by National Supply in 1950.

W. P. Streeter

Kett Power Plant Consultant

Kett Corp., consulting engineers, announces the appointment of Glenn C. Boyer as staff consultant on power plant engineering.

Mr. Boyer has had over 20 years of power plant engineering experience. He is a former associate professor of mechanical engineering at the Missouri School of Mines and is author of the book, "Diesel and Gas Engine Power Plants" as well as numerous technical articles. He is a member of the ASME Internal Combustion Engine Test Code Committee and is a past chairman of the Oil and Gas Power Division of the society.

Roper Names Sales Manager

Geo. D. Roper Corp. has announced the appointment of J. M. Hoskinson as sales manager of the Pump Div.

Mr. Hoskinson began his career with the company in 1939. He was in the Navy Bureau of Ordnance during World War II and upon his return worked on pump development design. In 1950, he became a sales engineer and held that capacity until his recent appointment.

J. M. Hoskinson

DEPENDABLE • ENTERPRISE • DIESELS

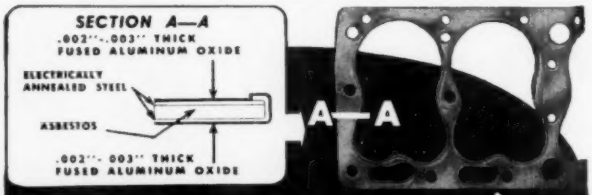
STATIONARY & MARINE

Diesel Power

AT ITS VERY FINEST, REFLECTING ADVANCES DEVELOPED BY SPECIALISTS LONG IN THE FIELD OF DIESEL DESIGN AND ENGINEERING

73 TO 2284 H. P.

Enterprise DEPENDABLE Diesels



FOR A LASTING, PERFECT SEAL IN HIGH COMPRESSION ENGINES Use Only

Fitzgerald Metallic Aluminum-Fused-Oxide Steel Asbestos Gaskets

Grease Retainers — Cork Gaskets
FITZ-Rite Treated Fiber Gaskets for oil, gasoline and water connections. Complete Sets For Motor Rebuilders.

FITZGERALD Gaskets
SINCE 1906
The Fitzgerald Manufacturing Company
TORRINGTON, CONNECTICUT

There's a Fitzgerald Gasket for every Engine

Continuous Duty
D.C. SOLENOIDS

Synchro-Start MODEL SD SOLENOIDS have an exceptional amount of power over a long stroke. The sealed casing protects these solenoids from seepage of dust and liquids. They are available with standard terminal studs (Model SD) or with the aircraft type AN Connector (Model SD-A).

Specifications—SD Solenoids can be furnished in all standard voltages up to 115 Volts D. C.

10 lb. pull over 1½ inch stroke.

Power consumption, 550 Watts pulling and 8 Watts holding.

Housing dimensions, 4⅜" x 2½".

SYNCHRO-START PRODUCTS, INC.
8151 N. RIDGEWAY AVE. • SKOKIE, ILLINOIS

Manufacturers of AUTOMATIC ENGINE CONTROLS
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and CONTROL EQUIPMENT

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MODEL K-120
universal peak firing and compression pressure indicator

The Model K-120 is the only maximum pressure indicator that can be used as a compression tester on small, high-speed engines and as a firing pressure indicator on engines having indicator valves. Patented Kiene diaphragm type check valve of stainless steel has no springs or piston, no complicated adjustments, temperature corrections or pressure loss. Bleeder valve permits release of indicator pressure for repeat readings. This instrument gives true pressure readings with an uncompensated gage.

Adaptors for most models U.S.A. engines. Others made to order at reasonable prices.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

organizational news

Burgess-Manning President

Ralph L. Leadbetter has been elected president of Burgess-Manning Co. to succeed Willis L. Manning who has been president since the company was organized in 1944. Mr. Manning will retain his position as treasurer and a member of the board of directors.

Mr. Leadbetter has been vice president since 1944 and was in charge of the company's Dallas Div. since it was formed in 1951. He and Mr. Manning were with the Acoustics Div. of Burgess Battery Co. before organization of the present company.

Other officers elected by the board were Jackson Burgess, chairman; Dudley W. Day, vice president; E. D. Woisard, secretary and assistant treasurer; and A. W. Dreffein, assistant secretary.

R. L. Leadbetter

Morse Widens Engineering Dept.

The formation of a new application engineering division within its engineering department has been announced by Morse Chain Co. to meet requirements of its expanding line of overload protection devices. It will be headed by Ralph E. Cherry, former executive engineer of the Detroit plant.

Earl E. Wesselhoff has been named assistant chief engineer in charge of the Detroit engineering laboratories, as well as development and production engineering. He was formerly assistant chief engineer on special assignment.

Both men have more than 30 years of service with the company. Mr. Cherry joined the Detroit engineering department in 1921 and Mr. Wesselhoff joined the same department in 1920.

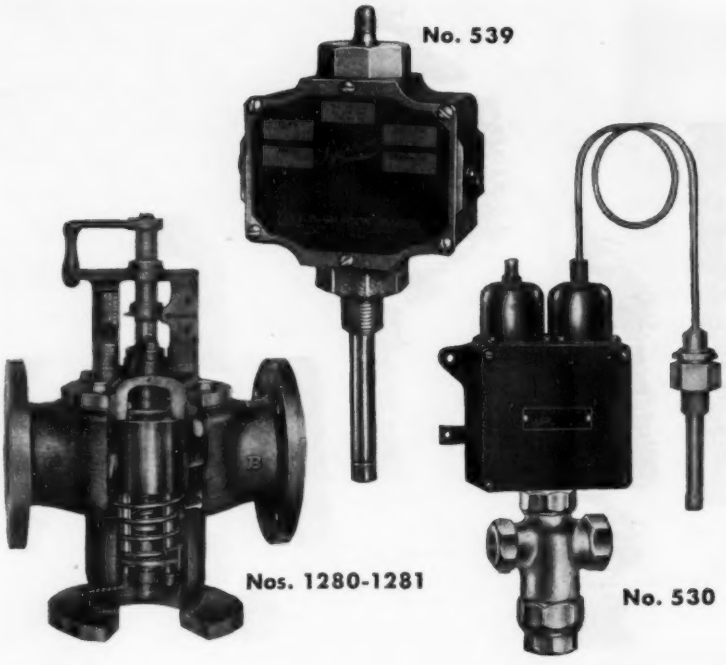
A. E. Fribance

Chief Engineer for Rochester

Austin E. Fribance has been named chief engineer of Rochester Mfg. Co. in charge of product design and research and development.

Mr. Fribance joined the company at the beginning of 1953. Before that he was an instructor in the electrical department of the Rochester Institute of Technology. He had previously served in the engineering department of Western Electric Co. and as an engineer for the South County Public Service Co. During the time he was at RIT, Mr. Fribance also was consulting engineer for several industrial firms specializing in electronically controlled automatic mechanisms.

(ORG. NEWS . . . Page 126)



Use this guide TO GET THE RIGHT ENGINE CONTROL

Pictured here are three automatic Sylphon Controls that are widely used to protect internal combustion engines against trouble, costly shutdowns and repairs. They help maintain efficient operations, reduce fuel and oil consumption. Check them over—see how they can help you get more efficient and economical operations. Write for details, ask for Catalog ND-817.

SYLPHON ENGINE CONTROLS 1280-1281

Three-way valve regulators especially adapted to control temperatures of cooling water and lubricating oil. Stable temperature is assured by use of powerful, pressure-insensitive, fusion-type thermal element. Control No. 1280 (pictured) is provided with quick-acting manual operator which may be used to override the thermal element to open and close the valve. (No. 1281 does not have manual operator). Both have over-temperature protection. Operating mechanism easily removed from valve body for service without breaking pipe connections. Compact, self-contained, self-powered.

SYLPHON SAFETY CONTROL No. 539

Protects against overheating or low lube oil pressure. If water jacket temperature goes above, or lube oil pressure goes below the safe point it sounds an alarm, flashes a warning light, or if desired, shuts down engine operation. "Fail-safe" type.

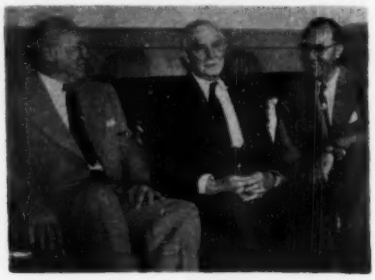
SYLPHON SAFETY CONTROL No. 530

Gives positive protection against high jacket water temperature and low lube oil pressure. If cooling water temperature goes above or lube oil pressure goes below safe limits, the engine is immediately stopped. Available with alarm feature.

Robertshaw-Fulton
CONTROLS COMPANY

FULTON SYLPHON DIVISION • KNOXVILLE 1, TENN.

news of our industry



Three Generations Meet

Gathered together above are three chief engineers of the Cooper-Bessemer Corp. The occasion is the celebration of the 90th birthday of James H. Debes (center), oldest engineer of the organization, who served as chief engineer from 1898 to 1920. Seated to the left of Mr. Debes is Hewitt A. Gehres, now director of engineering, who was chief engineer from 1920 to 1935. Ralph L. Boyer (right) is currently vice president and chief engineer.

48 Mack Trucks to Venezuela

Mack Trucks, Inc. announces that 48 specially built dump trucks have been delivered to the Venezuelan Ministry of Public Works for use in its mammoth Rio Guarico hydroelectric project. Basically LJSWX-D models, the 6-wheel diesel-powered vehicles are equipped with 10-cu yd heavy-duty rock bodies, power-steering, extra heavy-duty clutches, and balanced bogies with power-dividers.

The Rio Guarico project, which is expected to be completed in 30 months, involves the moving of 10 million cubic meters of earth. It will furnish power and irrigation for grazing and farming lands and is being studied as a potential source of water supply by the Venezuelan Institute of Health.

German Co. Builds in Canada

Ardeltwerke G.M.B.H. of West Germany will establish a plant in Kitchener, Ont., through its Ardelt Industries of Canada, Ltd. The parent company manufactures medium and heavy material handling equipment and diesel-shunting locomotives. The Canadian plant plans to make the same products.

news of our industry

Employes Buy Barnes & Reinecke

The Chicago design, research and development engineering firm of Barnes and Reinecke, Inc., has been bought by a group of its employes. For the most part, the new owners are engineers headed by Thomas W. Alder who continues as president, a position he has occupied for a year. The company, which started as a partnership, had been sold to Joy Mfg. Co. a year ago.

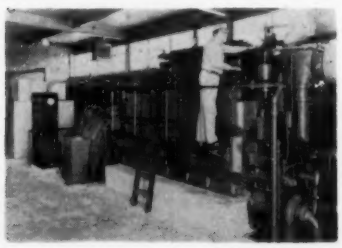
B&O Has Piggyback Service

The Baltimore and Ohio Railroad has inaugurated a service for the handling of highway trailers on flat cars. Known as "Tofcee" service, it provides coordinated door-to-door trailer service at six major cities on its system. The company is equipping standard 53-ft flat cars, each capable of handling two 24-ft. trailers.

Texas Project Adds Engine

Houston Water Works has placed its latest supercharged spark ignition gas engine into operation to augment the water supply to its industrial area. The new engine, built by Worthington Corp.'s Buffalo Works, is rated 980 hp at 600 rpm. It drives a 700-kw Electric Machinery generator supplying power to pumps.

Refineries, chemical plants, and other heavy industries have lately caused a large increase in water demands. The project, known as the San Jacinto River Project, is part of the city's plan for shifting from diminishing well supplies to surface water from the San Jacinto River. At present, four recently-installed Worthington pumps are operating, with a capacity of over 80 million gpd, in the potable water distribution system.



In romantic, historic Taos, New Mexico, trouble-free power service is vitally important. For that reason the Kit Carson REA plant uses three Nugent Duplex Fuel Oil Filters to protect and prolong the life of its three 960 H.P. Diesel Engines. These heavy-duty diesels generate power for all of Taos County, part of Colfax and Arriba Counties and parts of southern Colorado. A break-down in the system would affect 24,000 people including a group of Taos Citizens who drive to work each day at the Los Alamos Atomic Research Center 60 miles away.

Above: Nugent Duplex Filter—the type used to filter fuel oil for the Kit Carson REA plant, Taos, New Mexico.

Wherever engines must give long dependable service, Nugent filtering provides the type of protection that is essential. Offering more effective filtering at lower cost, Nugent filters are available in a complete range of sizes and types to meet every need. They utilize inexpensive bag-type cartridges having 20 times the filtering area of other filters of comparable size. Write for full data, outlining your filtering requirements.

NUGENT TRADE MARK

Wm. W. Nugent & Co., Inc.
417 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS
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Established 1897

news of our industry

Talgo Train for Rock Island

Rock Island Lines announces that it has become America's first railroad to place an order for a completely new type of train, the Talgo-type streamliner. ACF Industries, Inc. has started work on the train which has tentatively been named the Jet Rocket.

Design of the lightweight, high-speed equipment is said to be greatly improved over the original Talgo train built for operation in Spain, and its later counterpart now in service in Germany. The Jet Rocket will consist of four cars, each of which will be made up of three articulated units, and with a seating capacity of about 300. The train has the ability to accelerate and decelerate rapidly and maintain high speed on curves.

The new train will replace the road's present Peoria Rocket, the first of Rock Island's streamliners, and is expected to be in service December 1955. Due to its higher speed operation on curves, running time is expected to be shortened on the 161-mi route.

Each of the triple-unit cars will have an overall length of 109 ft. All electrical power needed will be provided in a transition car just behind the diesel locomotive. The equipment will take care of heating, lighting, and air conditioning. Operating cost will also be much reduced since the new train will be half the weight per passenger of present streamlined equipment. Frames of the articulated units will be of low-alloy, high-tensile steel, with outside sheeting of stainless steel.

For a complete description of earlier models produced by ACF, see DIESEL POWER, June 1949, pages 44-50.

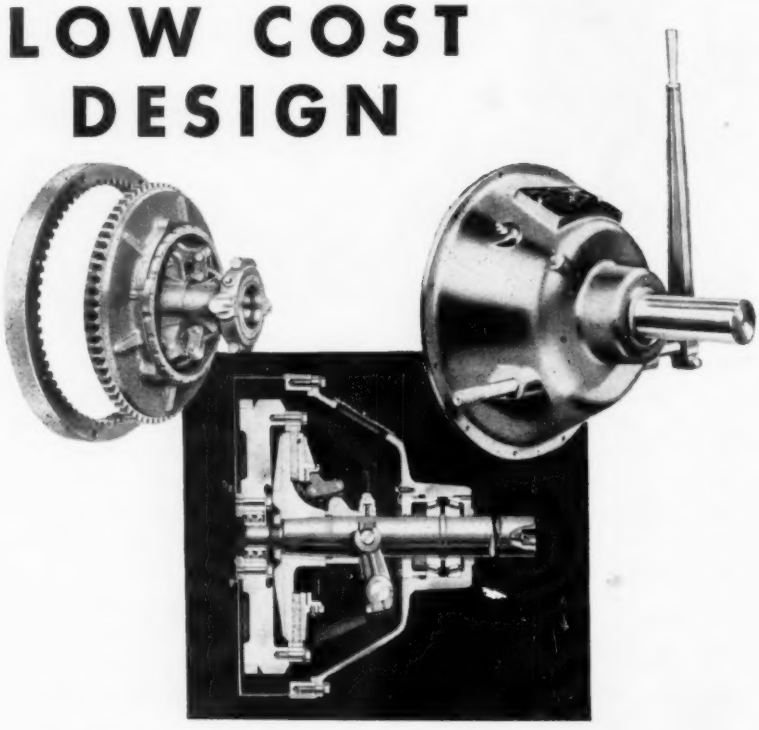
Municipal Buys 2810-Hp Diesel

The city of Hutchinson, Minn., has awarded the Nordberg Mfg. Co. a contract for a new 2810-hp diesel engine. The new engine is a 16-cyl, V-type, 4-cycle, supercharged unit and will run at 450 rpm. The generator will be a 2000-kw unit manufactured by Electric Machinery Mfg. Co. Installation is anticipated in the spring of 1955.

The municipal's power plant was started in 1936 with the purchase of three 430-kw units. A 1000-kw rating was added in 1938 and followed by two 2140-kw units, one in 1941 and the other in 1947. An interesting note is that the Light and Power Commission has been made up of the same three men since the inception of the plant.

With the growth in load, the 430-kw units had reached the point where their full individual rating was too small to work efficiently into plant operation, although the units were still in top condition. The improved design engine will be installed on the foundation of a 430-kw unit being removed, increasing plant capacity without incurring high building cost. Bids received by the commission were all on V-type, supercharged, 4-cycle engines at speeds of 327 to 450 rpm.

LOW COST DESIGN



ROCKFORD CLUTCHES constantly are being redesigned to eliminate unnecessary weight, size and parts. Operating ease and efficiency are improved. Vibration is reduced. Maintenance is decreased. Before you specify the clutches, power take-offs or speed reducers for your new model, it will pay you to learn how ROCKFORD design advantages will benefit the competitive position of your product.

ROCKFORD CLUTCH DIVISION BORG-WARNER
1301 Eighteenth Avenue, Rockford, Illinois, U. S. A.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER-TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCHES

news of our industry

London Dieselizes Trolleybuses

The world's largest trolleybus fleet operated by one transport organization, in London, is soon to be replaced by diesel buses. Trolleybuses are a cross between a streetcar and a bus, obtaining power from overhead wires, but with a long enough leash to permit weaving in and out of traffic.

The trolleybuses which carry 750 million passengers a year and have a seating capacity of 70 persons each, will be supplanted by 64-passenger lightweight diesel buses. The conversion will be accomplished in stages over a 3-year period.

Granted Supercharging Patents

Principles of a new supercharging system invented by Ralph Miller, Milwaukee consulting engineer, have been patented. Mr. Miller's development is familiar to those in the diesel field as the supercharging system used under license in Nordberg's "Supairthermal" engines. The development has been the subject of several technical papers and has taken nine years of patent application proceedings.

Fundamentally, it consists of a method of varying an engine's compression ratio without changing its expansion ratio. Methods of obtaining a cooler, denser charge of air are incorporated. The result is that high supercharging ratios may be used to develop high cylinder pressures—hence, high engine outputs—without proportionate increases in peak pressures and thermal loading.

The first three engines using the Miller system were installed in a power plant in the Caribbean island of Aruba in 1950. Similar units have since been installed in many services. Typical are the newly completed Lakehead Pipe Line and the Trans-Mountain Pipe Line where these engines were used for pumping. Other applications include power generation and marine service. The principle is being applied in England to high-speed engines for locomotive and marine application.

Tests are currently being conducted on an engine featuring the Miller system at the Naval Experimental Station at Annapolis. Also indicative of the Navy's interest is a development contract granted to a licensee under patent to build a high-power engine suitable for submarines and surface craft.

Mr. Miller, an American citizen born in Denmark, foresees the application of his system to a broad range of engines sizes and types. He contends that it could be applied to automobile and truck engines to operate on low-grade, low-octane gasoline, and double the current day mileage per gallon.

Ralph Miller

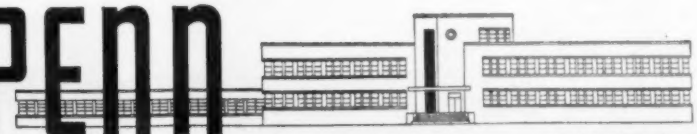
HOW

TO STOP "little troubles" from causing ENGINE BREAKDOWN

Yes . . . little troubles such as overheated cooling water or lube oil pressure failure can develop anytime in any engine. But, let them go undetected and serious engine damage coupled with lost productive time can occur. That's the big reason *your engines need Penn Safety Controls!*

Here's the protection you get! At the first hint of overheated water or oil pressure failure, the Penn Control will sound an alarm, flash a warning light, or stop engine operation . . . *whichever you choose.* Then, you can investigate and correct the little troubles *before* damage occurs. Learn more about this *low-cost* protection. Write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U.S.A. In Canada: Penn Controls Limited, Toronto, Ontario.

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, GAS APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

news of our industry

Westinghouse Drops B-L-H Stock

Baldwin-Lima-Hamilton Corp. has arranged to reacquire 515,000 shares of its own common stock by purchase from Westinghouse Electric Corp. The Westinghouse holding represents the largest single block of Baldwin-Lima-Hamilton, or approximately 10¾ per cent of all common stock.

The action was agreed to by the two companies after Westinghouse had decided to withdraw from the manufacture of heavy electrical equipment for railroads. Discontinued will be the manufacture of electric and mine locomotives and equipment for diesel-electric locomotives. The company, however, will continue the manufacture of renewal parts for this equipment. Future needs of Baldwin-Lima-Hamilton in the field of heavy electrical equipment will be supplied by General Electric.

Five hundred thousand of the shares reacquired by Baldwin were originally sold to Westinghouse by the company in 1948, when it was known as the Baldwin Locomotive Works, to provide working capital for diversification and to assist in financing changeover from steam to diesel locomotive manufacture. Baldwin-Lima-Hamilton Corp, was formed in 1950.

New Tax Ruling on Rebuilding

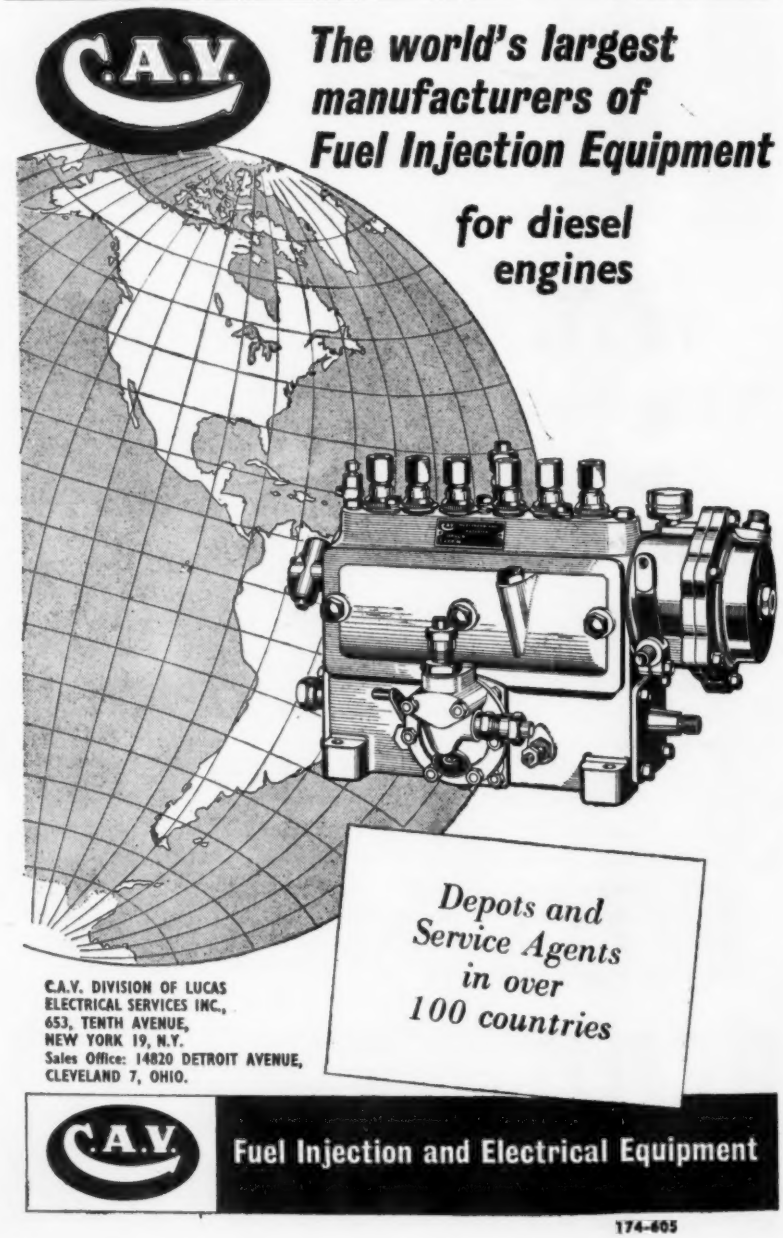
The Treasury Dept. has issued a new excise ruling on reconditioned parts which holds that custom reconditioning is not subject to excise tax. This information was disclosed by the Industry-wide Committee for Removal of Discriminatory Automotive Excise Tax of the Automotive Engine Rebuilders Assn. It was contained in a letter written to the committee's attorneys by the Tax Rulings Div.

The attorneys state that the ruling makes it clear that the restoration of a customer's part (custom reconditioning) is not taxable and records should be preserved to show where custom work and not the sale of rebuilt parts is involved. With respect to distinguishing between nonmachining operations and reboring or other machining, rewinding and comparable major operations, the old ruling still holds. The lawyers further add that it is reasonable to expect that widely varying interpretations will continue to be made in different collection districts.

Reconditioning is defined: "The mere disassembling, cleaning, and reassembling (with any necessary replacements of worn parts with tax-paid parts) . . . are regarded as reconditioning operations distinct from the manufacture or production of rebuilt articles. The sale or use of such reconditioned parts is not taxable, regardless of who performs the reconditioning operations. However, any new taxable parts produced or purchased tax free for use in further manufacture, but used as replacements in reconditioning such units, are subject to the tax when used by the reconditioner."

Iron and Steel Exposition

The Assn. of Iron and Steel Engineers is scheduling its 28th exposition and convention for Cleveland this year from Sept. 28 through Oct. 1. Fourteen technical sessions containing some 40 papers are set for the 4-day convention.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The world's largest manufacturers of Fuel Injection Equipment
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C.A.V.
Fuel Injection and Electrical Equipment
174-405

new literature

Fluid Filters

A new catalog describing its full line of industrial Auto-Klean filters has been published by The Cuno Engineering Corp., Meriden, Conn. Principles, construction, and advantages are described in full.

Specifications and capacities are given for all standard models of the filters which have flow rates between 1 and 3760 gpm and normal operating pressures of 125 psi. Applications and case studies indicate the range of service together with conditions requiring other types of filters.

Air Control Valves

Three fundamental types of air control valves are described and illustrated in a 4-color, 12-page booklet published by Ross Operating Valve Co., 120 E. Golden Gate, Detroit 13, Mich. The models are the integral pilot-operated, the remote-controlled, and the direct-operated valve; said to be adaptable to a wide range of operations.

Colored diagrammatic drawings show how the air flows through the valves to the operated cylinders. Advantages of each type, an explanation of how they work, and a list of available standard models are included.

Industrial Truck Safety

The do's and don'ts of safe operation of industrial trucks are detailed in literature available from The Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio. In total, 31 rules for effective safe operations are pictured and discussed. Operator training suggestions are also included.

Stock Roller Chain Sprockets

An 8-page catalog describing its newly expanded line of stock sprockets is available from Morse Chain Co., 7601 Central Ave., Detroit 10, Mich.

Sizes and prices are listed for the various types of Taper-Lock stock sprockets and bushings along with specifications for each. Included also are details on packaged roller chains and links with installation and removal instructions.

For Dependable Lubrication in Tough Service

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STRATOFLEX Precision Elbow Hose Fittings are designed and engineered to fill your requirements. Whatever your specifications in detachable reusable hose fittings, and flexible hose assemblies, specify STRATOFLEX!

PRECISION ELBOW HOSE FITTINGS

- AVAILABLE IN ALUMINUM OR STEEL
- ALL SIZES • ANY ANGLE OF BEND
- FLANGE & SWIVEL NUT CONNECTIONS

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How much of your engine maintenance bill is due to repair of breakdowns that could have been avoided—*if you'd had advance warning?*

At a fraction of that cost, Alnor Exhaust Pyrometers offer you a constant check of engine performance—advance warning of

Cylinder Overload **Preignition**
Scaled Jackets **Clogged Ports**
Detonation **Faulty Injection**

Get the best from your diesel—minimum fuel consumption per horsepower and long service uninterrupted by foreseeable breakdowns. Get constant protection of your engine, cylinder by cylinder, with an Alnor engineered Exhaust Pyrometer System.

Get Full information—Quickly! Your nearby Alnor Diesel specialist is conveniently listed in the classified directory. Ask him to help you select the Pyrometer and thermocouple assembly designed for your engine. Or send for Bulletin 4361 with complete details of the full Alnor line of Pyrometers.

ILLINOIS TESTING LABORATORIES, INC.
Room 507, 420 N. La Salle St., Chicago 10, Illinois

new literature

Stud Welding Kit

A handy wall chart intended to facilitate selection and ordering of welding studs is included in a new kit now available from the Nelson Stud Welding Div., Gregory Industries, Inc., Lorain, Ohio. The chart lists part numbers and dimensions of standard stock threaded MG studs and ceramic ferrules. Special purpose studs as well as equipment used in the fastening method are also illustrated and described.

The kit also includes the manual "How to Design for Nelweld" and a stud welding catalog. It comes in a special mailing tube that simulates a threaded stud.

Centrifugal Pump Fundamentals

Of use to all pump operators and maintenance and installation men is an instructive 12-page booklet entitled "Centrifugal Pump Fundamentals", being made available by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. It explains the principles of operation, defines the various terms used in pump calculations, and works out typical pump problems. Simple illustrations and comparisons are used, and where necessary, typical problems and curves.

Gas Reformer

Details of a reforming process for producing interchangeable gases at low cost are contained in a bulletin published by Engineering and Construction Div., Chemical and Gas Dept., Koppers Co., Inc., Pittsburgh 19, Pa. The illustrated bulletin also includes a description of the reforming process and equipment and a flow diagram.

Diesel Maintenance Chart

A maintenance clinic chart has been produced by Worthington Corp., Harrison, N. J., designed as a handy reference for the operating engineer.

Entitled, "Locating Troubles in the Diesel Engine," the chart covers symptoms and possible causes of common troubles in lubrication, air system, fuel system, exhaust, settings and balance, water system, and so on. For copy, ask for RP-739.

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new literature

GMVA Compressor Bulletin

The Cooper-Bessemer Corp., Mt. Vernon, Ohio, has just released comprehensive engineering details on its newest engine-driven compressor, the GMVA, in a descriptive 22-page bulletin.

The bulletin gives latest developments of the company in mechanical scavenging of 2-cycle engines by rotary blower. Performance charts are furnished along with cutaway drawings for complete engine details, installation, and operating data. The compressor is powered by a 2-cycle engine having 14-in bore and 14-in stroke. It is built in 4, 6, 8, and 10 cyl and develops 540 to 1350 hp at 300 rpm.

Hoist Classification Chart

To provide a means of standardizing capacity ratings and a convenient method for comparison of hoist manufactured by its members, the Hydraulic Hoist and Steel Dump Body Mfrs. Assn. has published a hoist classification chart. The chart places all hoists in classes depending on torque ratings in in-lb developed by the hoist around its hinge shaft. Also included is a table for determining size or rating of hoist for different jobs.

The association has also compiled a separate glossary of terms used by the industry, providing standard terminology for the hoist and body field. Requests for copies should be addressed to J. R. Pat Gorman, Executive Secy., the organization, 1740 K St., N.W., Washington 6, D. C.

Engine Bulletin

The Cooper-Bessemer Corp., Mt. Vernon, Ohio, has released a new engineering bulletin describing its latest type-JS engines. The bulletin provides specifications and descriptions on the complete line of 13-in bore and 16-in stroke diesel, gas-diesel, and spark-ignition gas engines.

Cutaway drawings showing engine detail, as well as performance charts of the atmospheric and supercharged engines are included. Typical installation photos are also contained.

Set Screw Catalog

Catalog 19, a 24-page book devoted to description, technical data, prices, and reference information on set screws, both conventional and self-locking types, has just been issued by Set Screw & Mfg. Co., 190 Main St., Bartlett, Ill. Among features are an enlarged section of general screw thread data, and a preview of special set screws that will soon be ready for marketing.

Land Clearing Equipment

R. G. LeTourneau, Inc., Longview, Tex., has issued a 2-color folder describing its line of heavy-duty land clearing equipment, electrically controlled and operated. Featured are the two chief members of the company's line, the tree saw and the LC tractor, both diesel-electric powered and mounted on rubbed-tired electric wheels. A cost analysis sheet is included.

Welding Positioners

A descriptive bulletin on P&H welding positioners has just been made available by Harnischfeger Corp., Milwaukee 46, Wis. The bulletin outlines important features and gives condensed specifications on four different models with capacities up to 35,000 lb.

An efficiency graph based on typical welding jobs enables the reader to get a picture of production advantages. A section on attachments for special jobs is also included.

Maintenance Cleaning Guide

How-to-do-it charts based on in-plant maintenance procedures are a feature of the new "Plant Maintenance Cleaning Guide" published by Oakite Products, Inc., 19 Rector St., New York 6, N. Y.

Designed for quick reference, the procedure charts list recommended cleaning materials, concentrations and temperatures, methods of application, and equipment recommended for handling each job in an entire plant. The second section gives descriptions of specially designed cleaning materials. Final section describes equipment for applying and handling solutions.

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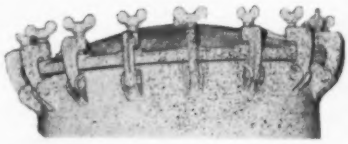

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new products

Bus and Truck Mufflers

Alexander-Tagg Industries, Inc., Hatboro, Pa., has announced availability of a complete line of heavy-duty replacement mufflers and accessories for buses and trucks. The line consists of three basic types, the power guard, sound sentry, and a special diesel muffler.

The mufflers are heavy gauge, all-welded steel units said to reduce noise while increasing engine performance. Claimed also is an increase in available payload horsepower, better fuel mileage, and reduced maintenance due to burned valves and cracked manifolds.

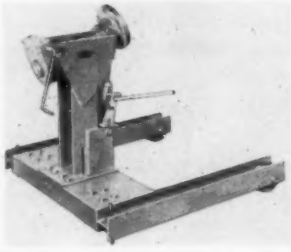
ATI states that the mufflers are the result of a 2-year study made to determine proper specifications for all buses and trucks now in use. They are claimed designed to optimum volumetric ratios between engine and muffler as well as ideal cross-sectional ratios between exhaust pipe size and muffler diameters.

Test-Light and Fuse-Puller

A combination test-light and fuse-puller is being marketed by Holub Industries, Inc., Sycamore, Ill. The product is claimed to eliminate danger of inserting and removing cartridge fuses by hand. It prevents bending of clips by improper removal and may be used for handling live electrical parts up to 600 v, AC or DC. When testing circuits, light glows once on DC and twice on AC.

Engine Work Stand

Bacharach Industrial Instrument Co., 7301 Penn Ave., Pittsburgh 8, Pa., is introducing an engine work stand which, it states, combines the advantages of end roll-over operation and bench-level working height.

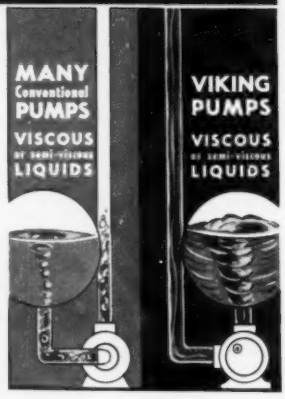


With it, a mechanic is enabled to raise or lower an engine weighing up to 5000 lb by one simple operation without help or use of auxiliary equipment.

Designed for side mounting of an engine, the stand permits rotation 360 deg in a vertical plane by hand operation of a crank which operates a 60-to-1 ratio worm and drive gear that revolves a heavy-duty spindle. Spindle is hinged and can be tilted up with the stand's hydraulic jack to provide required swing radius for the engine. At maximum tilt, swing radius is 34 in. Opening of the jack's relief valve returns spindle to horizontal position at a controlled speed.

The stand comes either as a mobile unit (mounted on 4-wheel dolly), or stationary for floor-bolting. It is said to be readily adaptable for holding all well-known engine models as well as automotive components, with adapter plates for holding various models available. Steel plate bolted to flanged end of main spindle accomplishes adaptation. Complete details are available in Leaflet 683.

If you need POSITIVE PUMPING specify VIKING



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new products

Water-Resistant Insulation

Development of a new water-resistant insulation for hot piping and equipment, said to offer a solution to the problem of insulation damage resulting from severe water exposures, has been announced by The Magnesia Insulation Manufacturers Assn., 1317 F Street, N.W., Washington 4, D.C.

The new form of 85 per cent magnesia is said to be especially useful for underground pipelines subject to flooding; process equipment and piping requiring hosing or washing down; and similar conditions. The water-repellant additive will not affect the conductivity, density, or other properties of the conventional magnesia insulation, it is stated, and will be offered only where severe moisture problems exist or when specified by user. Conventional 85 per cent magnesia insulation will continue to be the industry's standard.

Internal Tube and Pipe Wrench

A new type of internal expanding pipe and tube wrench, called Tube Tule, is being manufactured by Double T Products Co., 301 Acacia St., Hawthorne, Cal. When expanded in a pipe or tube of any material, the instrument is said to exert a gentle but positive internal grip with no slippage, no matter what external pressure is applied by any kind of wrenching device.

The internal expanding section of the wrench is composed of six equal round-surface sections which expand uniformly by forced movement up the beveled section of the head when hand or wrench pressure is applied. Where pipe ends are flush with a wall and it is impossible to get an external grip with a wrench, the tool is inserted and then exterior wrench pressure can be applied to the section extending out of the wall.

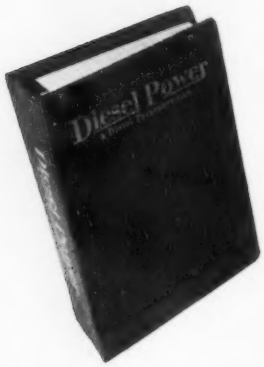
The tool can also be used to get in behind walls, and in other places hard to get at, by the use of a hexagon head extension wrench. When provided with a rubber seal, the device makes it possible to seal an air, fluid, or gas line while work is in progress. It is manufactured in three sizes.

Cartridge-Type Demineralizer

Barnstead Still & Sterilizer Co., 195 Lanesville Terr., Forest Hills, Boston 31, Mass., announces a new Model BD-2 pressure bantam demineralizer, a wall-mounted unit that connects directly into any water line as simply as a filter. It is non-regenerative, but employs a replaceable resin cartridge.

The unit delivers water in continuous flow under pressure from 5 to 25 gph with no heat or cooling water required. The manufacturer states that no operating attention other than a change of cartridge is necessary.

Diesel Power Binder



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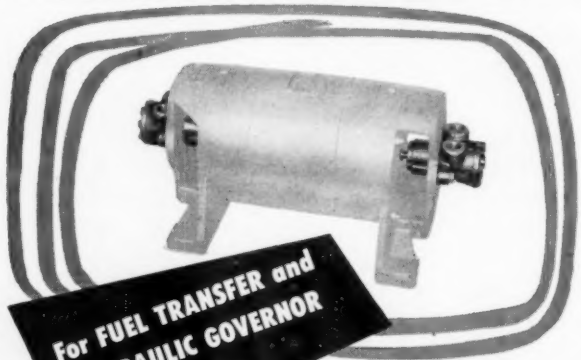

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new products

Cold Weather Engine Starting

Designed to quick start all types of internal combustion engines at temperatures as low as 65 deg below zero, is the new Chevron pressure primer system developed by Standard Oil Co. of California, 225 Bush St., San Francisco 20, Cal. The system uses Chevron priming fuel packaged under 250 lb of pressure in a 9.9 cc steel bulb with welded closure. The fuel is highly combustible, permitting the engine to run until it builds up enough heat to operate on regular fuel.

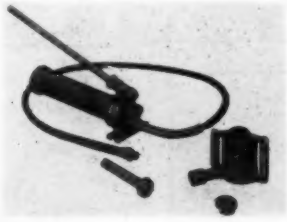
The operator controls release of the bulb from the cab by means of a small discharger installed on the dashboard. When priming fuel is needed, a bulb is placed in the discharger, a lever pushed to pierce the steel cap of the bulb, and the priming fuel is directed through a small tube connected to the engine air intake system. The fuel enters the engine in a finely atomized spray.

The bulbs are built to withstand between 6000 and 8000 lb of hydrostatic pressure in temperatures of over 600°F. In addition they are cadmium plated to prevent corrosion while in storage. The discharger, too, is waterproof and dustproof.

Portable Power Gear Puller

Armstrong-Bray & Co., 5364 Northwest Hwy., Chicago 30, Ill., announces a portable single-ram hydraulic power unit for pulling or pushing gears, wheels, bearings or parts. It consists of a small hand-operated hydraulic pump, connecting hose, and single-ram hydraulic actuating unit.

With a few strokes of the pump handle, thrusts up to 35,000 lb are said to be developed. In order to assure accurate alignment of thrust along the center line of the puller's forcing screw, the power unit has a single ram placed concentrically in the cylinder. This design feature, it is claimed, prevents wedging, power loss, or scoring of cylinder walls, and reduces unit maintenance. Other features of cylinder include universal mounting brackets and spring return of ram.



The pump handle is designed to prevent barking of knuckles and also serves as a carrying handle. It is equipped with a manual pressure relief valve and independent safety valve. The unit works with standard wheel pullers or may be obtained with special accessories for specific applications.

Vibration Unit Damper

Lord Mfg. Co., 1635 W. 12 St., Erie, Pa., announces development of a new vibration damper to provide the additional damping required in many vibration control systems, and to provide damping in any direction.

Amount of damping is varied to fit characteristics of the particular suspension system. Application is claimed to reduce the amplitude at resonance and to result in lower forces transmitted to the mounted equipment, prolonging mounting life.

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new products

Spray-Form Moly Lubricant

A dispersion of micro-fine solid lubricants, principally molybdenum disulfide, is being manufactured by The Alpha Corp., 179 Hamilton Ave., Greenwich, Conn. The carrier is blended for applying a controlled uniform flow of MoS_2 to metal surfaces by spraying from a self-pressurized aerosol-type container.

Called Moly-Spray-Kote, the product is non-inflammable and may be sprayed on hot surfaces. It is also said to be non-corrosive and non-toxic and does not contain a resin binder. The lubricant dries quickly, leaving a solid film. Heating of the part to be sprayed will help provide a uniform coating, after part is first cleaned with a standard cleaning solvent. The product is said to effectively prevent galling and seizing.

New Filter Element Line

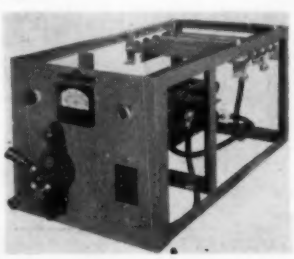
Winslow Engineering Co., 4069 Hollis St., Oakland 8, Cal., is producing a new line of laminated paper elements to supplement its standard filters and to meet increasing demand for paper elements in the replacement and original equipment markets. They will be available for both automotive and industrial engines.

The filtering paper used is precured and compressed with over 500,000 lb of pressure. Result is said to be microscopically fine filtering media of even density. To prevent channeling of oil inside the element, heavy felt pads are cemented between the metal end plates and the filter paper. Other features include a perforated steel center tube to provide overall rigidity and special self-adjusting end seals to prevent external bypassing.

Charging Panel For Batteries

A versatile charging panel suitable for use by railroads has been announced by Curtis Development & Mfg. Co., 3266 N. 33 St., Milwaukee 16, Wis. Two types are available, one rated at 150 amp for use on a 75-v DC supply line, and the other rated at 150 amp for use on 50-v supply line. Units with higher ratings and other voltages can be produced for specific needs.

All models are of the "dead-front" type. Components of instrument panel include: pilot light for indicating when unit is operating; ammeter showing current charging; rheostat for stepless adjustment of charging rate; pushbutton for reading battery voltage; and disconnect switch. The units are rectangular in shape and are 19½-in wide, 17-in high, and 36-in deep.



Adjustable Gauges

Recently introduced by Ardec, Inc., Media, Pa., are six adjustable gauges whose adjustable jaws permit a total range from 0.708 in to 2.835 in. The instruments can be set with micrometer, indicator, or Johannsson block, depending on accuracy required. Each gauge has long jaws similar to "go" and "no go" plug gauges to permit straight entering.

After a gauge is set, it can be locked and wax-sealed to prevent tampering. The patented instruments are claimed ideal for production, quality control, inspection, and for measuring single boring operations, replacing telescope gauge and micrometer.

Packaged Porous Casting System

A low-cost, compact packaged system for impregnation of porous metals, based on polyester resins and a vacuum-pressure cycle, has been announced by American Metaseal Mfg. Corp., West New York, N. J.

Model 1-24-L occupies an approximate 3-ft by 11-ft floor area; Model 1-36-L covers a floor space of approximately 4 ft by 16 ft. Both units, mounted on steel platform and skids, come installed with a complete line of necessary equipment such as impregnating tank, cleaning and rinse tanks, reservoir, vacuum pump, vapor trap, valves, gauges, and pipes, and may be purchased with two impregnating tanks if desired.

organizational news

American Bosch Works Manager

William A. Damerel has been appointed works manager of the main plant of American Bosch Corp. at Springfield, Mass.

Mr. Damerel proceeds to his new post from the position of vice president in charge of manufacturing of LaPointe Electronics, Inc. His previous associations have been with Sperry Products, Inc., Burgess Battery Co., and Maxim Silencer Co., giving him a broad range of experience in the automotive, diesel, and railroad industries. As works manager he will have supervision over all regular and military production as well as production engineering.

W. A. Damerel

R. F. Lay

E. L. Miller

Cooper-Bessemer Promotes Two

The Cooper-Bessemer Corp. announces the appointment of Robert F. Lay as assistant general sales manager and that of Eugene L. Miller as assistant general manager.

Mr. Lay's appointment elevates him from chief engineer of the Product Div., held since the first of this year. He started with Cooper-Bessemer as a co-op student in 1924 and joined the Baldwin Locomotive Co. in 1934, where he became assistant sales manager. In 1940, he went to The Elliott Co. and subsequently became chief engineer and production manager of the Supercharging Div. He returned to Cooper-Bessemer in 1946 as head of the Stationary Engine Section.

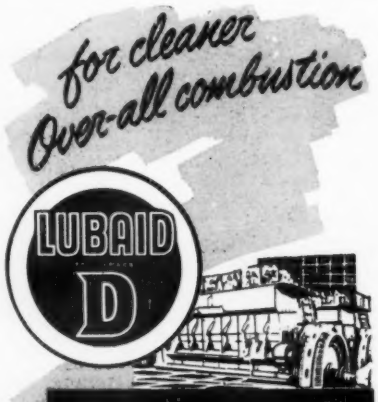
Mr. Miller goes to his new activity from the position of supervisor of application engineering. He first joined Cooper-Bessemer in 1946, having spent the previous four years in the armed forces. Before that, he had attended Oklahoma A & M.

EMD Factory Branch Manager

J. S. Chisholm has been named manager of the Salt Lake City factory branch of Electro-Motive Div. of General Motors Corp.

Before this appointment, Mr. Chisholm was manager of the factory branch in Los Angeles. He joined EMD in 1937 as a stock clerk and successively became stockkeeper, zone parts manager, branch plant sales manager, and manager of the Emeryville, Cal., factory branch.

J. S. Chisholm



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organizational news

Worthington Advances Two

Two Worthington Corp. men have assumed managerial posts in the power pump section's recent move from Harrison to the Oil City Works.

E. W. Theilig, formerly product engineer, has been named chief engineer. He first joined the company in 1917 as an apprentice in the drafting department of the Holyoke Works and served successively as detailer, junior designer and designer. He was appointed design engineer in 1932.

R. K. Grobholz will now serve as manager of reciprocating pump sales. He started with the corporation in 1943 as a test engineer in the Research and Development Lab. of the Harrison Works and served successively as application engineer for steam pumps and then power pumps for eight years. In 1952, he was appointed power pump section leader.

Commercial Filters President

The board of directors of Commercial Filters Corp. announces the election of Robert L. Fielding as president and treasurer of the organization.

W. E. Watson

R. H. Morse III

Fairbanks-Morse Elevations

Fairbanks, Morse & Co. announces two appointments. R. H. Morse III is now assistant to the vice president in charge of sales and W. E. Watson is the new manager of the Beloit Works.

Mr. Morse first began his career with the company in 1946, starting as a listing and release writer after completing a period of service with the Navy. He has been general manager of the Beloit Works for the last two years.

Mr. Watson joined the company in 1943 as manager of the St. Louis Works and was transferred to Chicago as manager of the Pump Mfg. Div. in 1946. He was later made assistant to the vice president in charge of manufacturing and was appointed works manager of the Canadian Locomotive Co., Ltd., the company's affiliate, in 1953.

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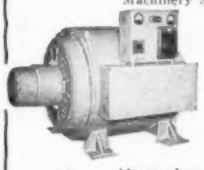

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STANDARD

Ralph Barbee, plant superintendent of the Las Animas Municipal Power and Light Company, checks the operating log with E. C. Jeffries, Standard Oil lubrication specialist.